THE BEST OF

S TS 1000 **U** TS 1500 **M** TS 2068

the SINCLAIR/TIMEX USERS MAGAZINE

A compilation of the best articles, reviews, programs, and hardware projects up through December, 1985

Welcome to the "Best of SUM"

Our Timex Sinclair User's Group began here in Gainesville in September 1982. The newsletter started out as postcards sent out to a handful of people telling them when and where the next meeting would be. In January of 1983, we started sending out a single sheet of typed "news" in the sinclair world, mostly news from Europe and short little tidbits of club going-ons.

Slowly we grew to a two page, and then to a four page - all typed. The July 1983 newsletter was the first one created using a word processor - the TS 1000 using Memotech's Memotext, their printer interface, and the Seikosha GP-100 printer (later to be known as the Gorilla Banana). It was right hand justified, and (we thought) looked great. It also contained pictures for the first time.

The newsletter stayed at four pages for the next year covering events at the last meeting, reviews, short programs submitted by our members and where to find hardware and software for our computers. The group was listed in all the major magazines and we were starting to receive correspondence from all over the US and some foreign countries!

When Timex called it quits in March of 1983, it looked uncertain as to the future of our computers, user's group, and newsletter. It appeared as if everything was going to dry up.

Instead, we were flooded with requests for more information on our group and newsletter. There was a great thirst for Sinclair knowledge from everywhere. Everyone wanted to unite to keep the faith going. So did we.

With requests on more information coming in everyday, Richard Cravy and I decided to turn the newsletter into a magazine. We felt that this would allow us to provide better quality to our readers than would a newsletter.

August 1984 was our first issue out as SUM Magazine. It was eight pages and had six articles and two ads. We had a mailing list of about 100 names to start with and licked stamps for each one until February of 1985, when we went to bulk mailing with about 300 subscribers.

As we gained more and more subscribers, we found that alot of new ones wanted back issues to catch up on what we had been reporting. This was fine until we ran out of the issues we had, but the requests kept coming. So as 1985 came to a close, we decided that we needed some way to satisfy all of you who still wanted those old articles. Enter BEST OF SUM!

BEST OF SUM contains all the major articles that have appeared in SUM from August 1984 to December 1985. Because there were some good articles back in our newsletter days, it also contains the best of those. We hope the wait was worth it for those of you who have been waiting for this, and look forward for more.

Richard and I want to thank you for your support in the past and hope that it will continue. Remember, we (and everyone else who supports the TS line) depend on you!

Joe Williamson

SOFTWARE REVIEW by Al Mollitor

CALORIE COUNTER
by Foote Software
For TS 1500 and TS 1000/16K RAM

Of the many people trying to lose weight, a few eventually discover that calorie intake must not exceed calorie expenditure. Counting calories can be a bothersome task, but for some of us, this may be the only way, at least initially, to balance our metabolic budgets.

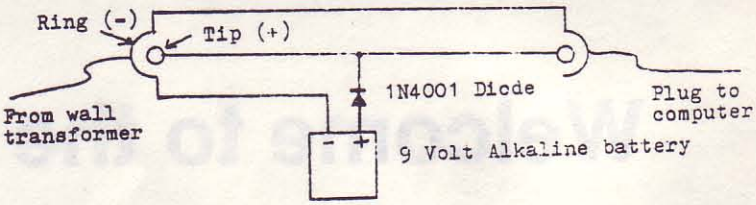
CALORIE COUNTER by Foote Software could be a handy way to keep track of calories. This is a very user-friendly, menu driven, BASIC program with three main parts.

First, the user must enter and SAVE the name, unit measure, and caloric concentration of all foods usually eaten. Up to 200 foods can be stored, and since only two examples are given, the user must gather calorie information from other sources. This allows the user to customize the program according to their particular eating habbits. Once the data is SAVEd, the user can select the menu item for counting calories. Fool-proof prompts guide entry of items eaten during a meal or day. A simple "TOTAL" command adds it all up.

Perhaps the most interesting part of the program is the routine that calculates calorie allowance. Based on sex, weight, and activity level, the program provides daily calorie expenditure. A comparison of this allowance with the number of calories determined by the counting routine can be very enlightening!!

In all, the program is very well written and is easy to use. It doesn't make it any easier to eat less, but no program can do that.

I can think of three improvements that could be made. There should be a routine for listing and viewing all the foods stored in the table, and there should be a way to edit any item in the list. Finally, the calorie allowance routine should be integrated with the calorie counting routine to provide an estimate of projected weight change over say, a one week or month period. This is a pretty good program, and it was produced right here in Gainesville! It represents a good value for someone who is watching their waistline and is looking for a more serious use for his or her TS 1000/1500.



BATTERY BACK-UP

Here is a simple battery back-up for your ZX81/TS1000 in case you lose power. When power is interrupted, the diode becomes forward biased and passes current to the computer. If you use a fresh alkaline battery, the computer should easily stay powered for one-half hour.

March 1983

NEW PRODUCTS

Memotech has just released three (four if you count the keyboard) new products. These three new add-ons are firmware, which is software that resides permanently on an EPROM.

MEMOCALC is a spreadsheet analysis program which enables users to perform complex number crunching routines with ease. Up to 7,000 numbers with up to 250 rows or 99 columns can be specified with a 64K RAM pack. Capabilities include entering new data to your formula and recalculating.

MEMOTEXT is a word processor program with full text editing on the screen and full control over output. 80 character lines, upper and lower case, single and double size characters are all available.

MEMOPAK ASSEMBLER is for the serious programmer of machine code for the TS1000. Full editing allows manipulation of individual lines and exact placing of source and machine code. Routines may be merged or listed (screen or printer). The assembler mode handles all standard Z80 mnemonics, hex or decimal, comments and user selected labels.

Memotech has put their disk drive on the "back burner" due to lack of demand. Timex's disk drive will probably come out after their color computer. Other companies do have disk drives available for the ZX81 and TS1000 now. Check advertisements in SYNTAX and SYNC magazines.

32K MEMOPAK INCOMPATIBLE

Memotech has announced that its 32K RAM packs are incompatible with the Timex TS2040 Printer. Memotech is working on the problem, but so far no theories on the cause. The 32K RAM Pack does work with the ZX Printer. All other Memopaks do work with the TS2040 Printer.

May 1983

MEMOTEXT REVIEW

You may have noticed that this newsletter is slightly different from previous ones. This is because this whole newsletter was created using Memotech's new Memotext which is a word processor.

The program comes to you in the form of an EPROM (Erasable Programable Read Only Memory) and is housed in the familiar Memotech case. After you plug in the program (with memory and printer interface), the program starts to run immediately (no tape loading). The first thing it asks is whether you are using a serial or parallel interface. I answered "parallel" for the Memotech parallel interface and printer I was using.

Next it prompts for DATE1 and DATE2 which can be any text or a date as the name implies. The information can be called and printed from your text file.

There are 17 functions you can use which affects both data and text files. Functions include Create, Amend, Delete, Display, Load, Save, Rename, and Print. The data file allows you to store names and addresses and call them for use by using abbreviations.

To create a text file, you type in CTF and the computer asks for a name for the file. Once entered, the program goes into text mode. Memotext completely redefines the scanning of the keyboard, so you can type as fast as you can, and the computer will keep up with you without any screen flicker. The format starts off with 66 characters per line, 60 lines per page and 6 blank lines between pages, but of course you can change all these.

You have control characters for tab, centering, headers, indenting, vertical tab, move on to start of next page, substitutes for DATE1 and DATE2, data file calls, conversion from hexadecimal numbers to binary (for printer control such as underlining and multi-pass strike over), current page number, soft hyphen and quit.

After you have typed in your text, you can move blocks of text and exchange them. After everything is correct, you can go into print mode. It asks for the name of the text file you want printed and whether you want it to print pages singularly or continuously. Next it prompts: "Justify y/n?", (a very nice feature). If you answer yest, all lines end in the same column except for end of paragraphs. If you answer no, you will have the typewriter style of "ragged right margin". It then asks for a page number for where it will start printing and then asks for how the data file will be entered, either from in-text prompts or select as you go along. There is even the choice of having it print a letter for each record in the data file, personalizing each letter respectively.

All in all this is one of the best and most useful programs for the Timex-Sinclair I've seen yet.

Joe Williamson

SUNTRONICS KEYBOARD REVIEW

The Suntronics KD-81 Keyboard is a fully cased keyboard with full-size keys, including 2 shift keys, and a space bar. The printed circuit board from the computer fits inside the new plastic keyboard's vaporized metal coated case. Assembly requires attaching the PC board inside the case with 5 screws and slipping the keyboard's ribbon cables into the computer's 2 keyboard sockets. After using the keyboard for one month, I find it works great and is easy to assemble and operate.

Roger Hunziker

24 USABLE LINES

Have you ever wondered why the TS 1000 won't print to the last two lines in the display? The reason is because the last two lines are reserved for editing. But while the program is running, why can't you use the last two lines then? The truth is, you can! The number of blank lines at the bottom of the screen is held in memory location 16418. If you PEEK this location, 2 should be the result. This variable is set by the computer when you power up. To print on the last two lines, POKE 16418,0. Now the computer has 0 blank lines at the bottom of the screen and 24 lines to print to! Don't use PRINT AT or SCROLL, as the system will crash.

Having those last two lines are useful if you are handling a lot of data and want to fill the screen with as much data as possible. Lets say you have data you are storing in a DIM statement in say DIM A(44,4). Here is a program you can use as a subroutine to display all this data in four screens instead of five and still have nice clean headings. After the screen fills, press enter for the next screen. After runnig it once, change line 6020 to POKE 16418,2 and try it again.

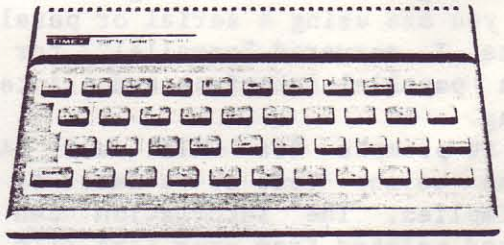
Joe Williamson

```
6000 LET M=1
6010 CLS
6020 POKE 16418,0
6030 PRINT " YOUR HEADINGS "
6040 PRINT
6050 FOR N=1 TO 22
6060 PRINT A(M,1);" ";A(M,2);" "
;A(M,3);" ";A(M,4)
6070 LET M=M+1
6080 NEXT N
6090 IF INKEy$="" THEN GOTO 6090
6100 IF M=44 THEN RETURN
6110 GOTO 6050
```

SOFTWARE REVIEWS by Richard Cravy

FROGGER by Cornsoft, TS 1000/16K. For those who have played the arcade version of FROGGER, there are differences. Besides the things we are used to with our TS1000s -- no sound and no color -- the Timex version compensates for the fairly coarse graphics of its screen by presenting only half the typical arcade at a time. The busy highway section fills the whole screen. As soon as this is negotiated, the screen switches to the river crossing. All in all, I rate this an excellent adaptation even though I'm still not as good as my children are! They assure me that the later screens get harder.

MOTHERSHIP by Softsync, TS 1000/16K. This game reminds me of the Death star in Star Wars as the fighters streak down the narrow canyon firing at each other. In MOTHERSHIP, you are offered three levels of difficulty. The basic object of the game is to destroy ten oncoming ships so you can get a shot at the Mothership located beyond the end of the corridor and who is fighting back. This program makes outstanding use of the graphics and simulates the turning of the surface beneath your fighter as you fly. This is another good game for those of us who love to play.



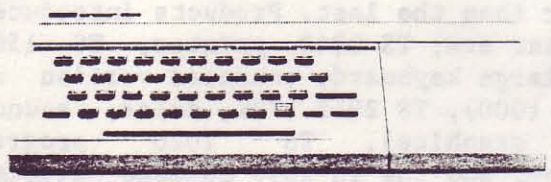
TS 1500 REVIEW

The new 1500 is here and it lives up to everyone's expectations of being the perfect "big brother" to the TS1000. Sporting a long awaited large-style keyboard, the 1500 is wider than the 1000, but overall, shorter than the 1000. 16K of RAM is built in this time with the availability of expanding out to 32K with the addition of Timex's 1016 16K RAM pack. Other RAM packs do not work with the 1500, although most peripherals do. We know for certain that Memotech's Assembler, Memocalc, and Memotext all work, but not their RAM packs.

The rear-edge connector bus has been buffered, so connecting to the "real world" will be safer, and current drain is less than the 1000 with 16K attached. This is due to overall economy on chips and use of CMOS technology. The RF modulator is Timex built, and part of the circuit board with TV channel output changed via the keyboard as you power up. A better shielding scheme reduces radiated interference and the rubber-like keys provide a very positive feel.

Sample software comes with the computer which includes Grimm's Fairy Trails (like PacMan) and Biorhythms, plus a load check program to help you find optimum level settings on your tape recorder. Also, a much more concise and well written user's manual is included which deserves its own review (far better than that included with the 1000). All in all, the 1500 is an excellent machine with a pricetag less than $100 as the TS 1000 was advertised only a short year ago with only 2K of RAM!

Joe Williamson



TS 2068 REVIEW

When I last wrote about the 2068 two months ago, I really didn't have a chance to put the computer through its paces. I didn't even have a color TV to work with! Well, now that they are out and I have one, I had better finish that article. Even though they advertise eight colors, the BRIGHT command gives you two brightnesses for each color for a total of 16 distinguishable colors. The colors are strong and vibrant with less interference than I had expected. Each color can be given to the BORDER, the PAPER, and the INK and all can be mixed at any given time with different brightness levels. The display can be set in different modes and has the ability to display 64 characters per line through software control which will undoubtedly be used with Timex's modem and word processor package plus a number of games.

The printer flawlessly COPYs each pixel printed on the screen so long as it is not the same color as the paper. The user's manual is good in its presentation of the 2068 although it does assume some prior knowledge of computers and BASIC programming in general. Learning to use the sound generator is probably the most complex part of the book. It will take awhile to understand and use it although the book does supply several routines to get you started.

The keyboard has a good feel to it and includes raised homing dots on the F and J keys. A unique feature with the auto-repeat function while using delete is that the line number and semicolon (used to seperate multiple commands in one line) will not erase immediatly thus preventing you from accidentally deleting into the next "good" or wanted BASIC command or line number. However, holding the delete key down for three or four repeats will allow you to override this feature and delete more. The LIST command has the feature in that it will list the first 22 lines of a program and than prompt you with the question: "SCROLL?" If you hit any key other than n, BREAK or the spacebar, the next 22 lines will be listed and so on. Editing is done the same as before. The inverse greater than cursor has been replaced with a "true" greater than cursor and does tend to get lost in the text, but using say LIST 1000 will always make the edit line line 1000 as before.

Nine new I/O commands have been added to support mass storage and other devices directly from the keyboard. Also, Inputs from the two joystick (how about inputs from something other than joysticks? - why not?!) ports are selected by the STICK command.

The DATA, READ, and RESTORE commands have been added which allows easier manipulation of data thoughout your program. LOADing and SAVEing are five times faster than on previous units and a tone header allows the computer to sense and adjust to differences in tape recorder motor speed which helps assure good loading every time. Also, as the tape loads, the title appears on the screen telling you that you are LOADing the correct program. The same is true for DATA and CODE loading. MERGE is included which

allows you to merge one program onto another.

POINT will check to see if the next pixel is "on". FREE gives the amount of available memory. ATTRibute checks for the characteristics of a character block. BINary is used in creating user defined graphics or just entering in binary form. BEEP beeps for a specified duration and frequency (different from SOUND). CIRCLE draws a line from a specified position and radius. DRAW draws a line from specifed point to specified point (can go through any type of mathematics). DEF FN and FN allows defining a function and then calling it in a program. ON ERR allows trapping of errors, correcting them, then continuing without breaking the program. A handy quick reference guide is included which covers the BASIC operating system.

Joe Williamson

BOOK REVIEW by Joe Williamson

TIMEX/SINCLAIR INTERFACING by James M. Downey and Don Rindsberg contains more than seven tested hardware projects for the ZX80, ZX81, TS 1000, and the TS 1500. The book is well written and concise, intended for someone with some knowledge of electronics and microcomputers. The book begins with the fundamentals of microcomputers and construction techniques. It also tells you how to build a logic probe for debugging any problems that arise. The book goes into great detail of memory mapping and how to decode memory.

The construction articles include how to build a relay controller, digital-to-analog and analog-to-digital converters, joystick interface, serial and parallel printer interface, additional memory and how to make your computer into a dumb terminal for communicating with host computers. All the projects are easy to understand and use readily available parts. The dumb terminal and printer projects even include machine code programs to drive the interface plus many BASIC routines are included for using each project.

Even though this book was written with the beginner in mind, you should not tackle any of these projects without gaining some experience with simpler projects and learning good soldering and/or wirewrapping techniques. All in all, this is the best book I've seen so far in making hardware additions to your Timex/Sinclair. I found my copy at B. Dalton's bookstore.

1983

Last year was quite a busy year for the home computer market. New products making their debut with some making it to the shelves while others are shelved before being released. Still others went bankrupt or got out of the home computer market all together. Timex, on the other hand, is still going strong with a good share of the market (sinclair shipped 35% of the 1,775,000 microcomputers shipped in 1982).

Meanwhile, Timex keeps introducing new and better products which turn out more popular than the last. Products introduced last year are: TS 2040 printer, TS 1500 (16K, large keyboard, enhanced version of the TS 1000), TS 2068 (72K, color, sound, hi-res graphics), TS 2020 program recorder, and the TS 2090 command sticks. And still more products will be available this year!

Support from user's groups like ours are a major contributor to the success of a computer because as a group we can get together and discuss problems we are experiencing and work them out instead of giving up all hope of ever learning to use a computer. This year should prove to be more successful than ever due to all the support we have generated for our computer. So lets work on that theme for 1984.

SETTING UP THE 2068

Next time you sit down to program on your 2068, try this upon powering up: CLEAR 65535: POKE 23561,10: POKE 23562,2: POKE 23609,5. The CLEAR 65535 gives you the most free memory available. At this

point, PRINT FREE should give 38820. Normally, the computer sets aside some memory for user defined graphics, this of course wipes out that area, so if you plan on using user defined graphics, I would not suggest using CLEAR 65535.

POKEing 23561 with 10 reduces the amount of time before repeat begins. POKEing 23562 with 2 shortens the delay between successive repeats and POKEing 23609 with 5 makes the keyboard click length longer so you have a better chance of hearing it.

To emulate the scroll command not found on the 2068, use POKE 23692,2. To print down to the 24th line, use POKE 23659,0. To avoid crashing the system, you must POKE 23659 back to 2 before anything else is done to the screen.

As far as colors are concerned, I like to use blue BORDER and blue PAPER with white INK when using a color monitor and white ink on a black background when using a monochrome monitor. Try different combinations to see what you prefer to stare at for hours on end.

The ON ERR command is quite a powerfull and usefull new addition to Sinclair BASIC. Using this command, you can trap errors such as invalid inputs or accidental "breaking" of a program such that even the most inexperienced user of the program can use it without worrying what to do if they accidentally break into the program. It also safeguards the program against unauthorized copying of the program, but be sure and put a "back-door" code into your program so YOU can break into the program and make any modifications that may become necessary.

The 2068 has three options that can be used with ON ERR. ON ERR GOTO makes the computer go to a specific line number (such as a menu) to handle an attempt to break into a program, ON ERR CONT makes the computer continue where the error occured (such as an INPUT statement), and ON ERR RESET which disables ON ERR.

I have used this command in several programs I have written and like it's function very much. If you are writing software for resale, the fact that it helps protect the program makes it invaluable.

Joe Williamson

Headline -- February 24, 1984
"TIMEX LEAVES THE MARKET"

Timex Computer Corporation drops out of the home computer market! You read it right. Timex is not continuing with its computer product line. Why? Well, you may have noticed that they never did much advertisng, and because of that, they put themselves under. Sinclair has been critical of how Timex handled their computer all along. So, out with Timex and back in Sinclair?

Not exactly. It's true that Sinclair will be marketing the QL cccome fall by mailorder, but not their other products. The reason is they are not FCC type approved. They could easily have it done, but the money involved may be too great. They could continue with the present Timex line. Who knows?

After speaking with Sinclair last Monday, they have no plans to continue with past products, but hopefully they (or some one else) will continue with the current fine line of Timex-Sinclair products. If anything, it would be nice if Sinclair would supply software for all of our computers. The software all seems compatible, even most of the Spectrum software works on the TS-2068 we've found.

In the meantime, the Timex Modem will be released and looks like an excellent value for $120. Having auto-dial, auto-connect, and auto-log on facilities. The modem is compatible with the whole line. They should be shipped this month. That is all Timex says they will produce; what else will come is anybody's guess.

I am personally maddened by this news. Here Timex has been painting a rosy picture that Timex is doing better than ever and then they do this.

Now more than ever user's groups play an important part in supporting computers. They may become the sole source for finding information on their computer. Please support your user's group and pass on or gain information on your computer.

March 1984

TS-2068 GETS RAVE REVIEWS

Since Timex finally introduced its new Timex-Sinclair 2068 color computer this past October/November, it has received very favorable reviews in most of the popular microcomputer magazines. Those which I have seen and read are the following:

COMPUTER SHOPPER, November 1983
COMPUTERS & ELECTRONICS, November 1983
INFOWORLD, December 19, 1983
MICROCOMPUTING, February 1984
CREATIVE COMPUTING, March 1984
COMPUTE!, March 1984

These are in addition to the various reviews found in magazines devoted specifically to the Timex-Sinclair computers such as SYNC and TIMEX SINCLAIR USER.

In order to give you an idea of how favorable these reviews by non-TS fanatics are, I've given several of the more impressive quotations below:

"In terms of memory, graphics, and sound, the Timex Sinclair 2068 is an impressive entry into the under $200 market." (COMPUTE!)

"Physically, the TS2068 is an attractive little computer...The TS2068 is well equipped for playing games...When it comes to graphics, the TS2068 outperforms almost every other computer in its price range... For $199.95 retail, the Timex Sinclair 2068 personal color computer represents one of the best buys on the computer market today. Aimed at the home user, the TS2068 is certainly capable of living up to almost any entertainment, educational, or computer tutorial expectations the prospective purchaser may have. For those satisfied with, yet looking to graduate from their ZX-81's and TS1000's, I can think of no better computer." (CREATIVE COMPUTING)

"As for third-party support, there isn't much (if any) right now, and whether there will be in the future remains to be seen...Publishers are more cautious than optimistic, so it will probably be at least a year (if at all) before third-party programs proliferate. It was the same story with the Commodore 64; I hope the Timex story will have as happy an ending...The Timex 2068 has promise; it has potential...And, if Timex does some aggressive marketing, you may find an explosion of third-party support available by next year." (MICROCOMPUTING)

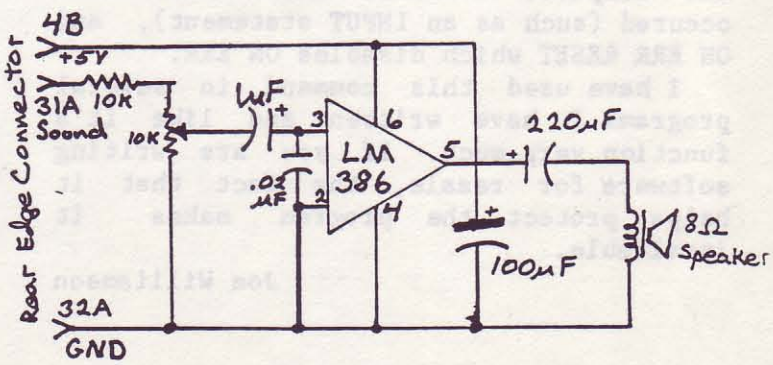
I know that we all hope that Timex does in fact heavily support with both peripherals and advertising the 2068. This will give new computer buyers out there the opportunity to learn about and buy one of our favorite machines. Considering how well Commodore has done with their model 64 and the huge software and hardware support that now exists for it, I certainly hope our machines will do as well. The Commodore machine is only now coming down into the price range where the 2068 is beginning! (The 64 started at $595!) I suspect Timex has room to drop prices later on, just as they did with the TS1000. Meanwhile, features like the higher resolution graphics and availability of 64 character screen lines which are not available as standard features on the 64 should clearly demonstrate the greater value of the 2068.

-- Richard Cravy

BETTER SOUND

To increase the volume of SOUND on the 2068, try this little circuit. All the components are available at Skipper Electronics including the edge connector. Circuit placement is not critical, but try to keep the signal lead as short as possible. In place of the #4B connection, you can use a 9 volt battery. The 'A' side of the the connector is toward the top of the machine, and the slot is designated as pin #6.

-- Jim Clark
April 1984

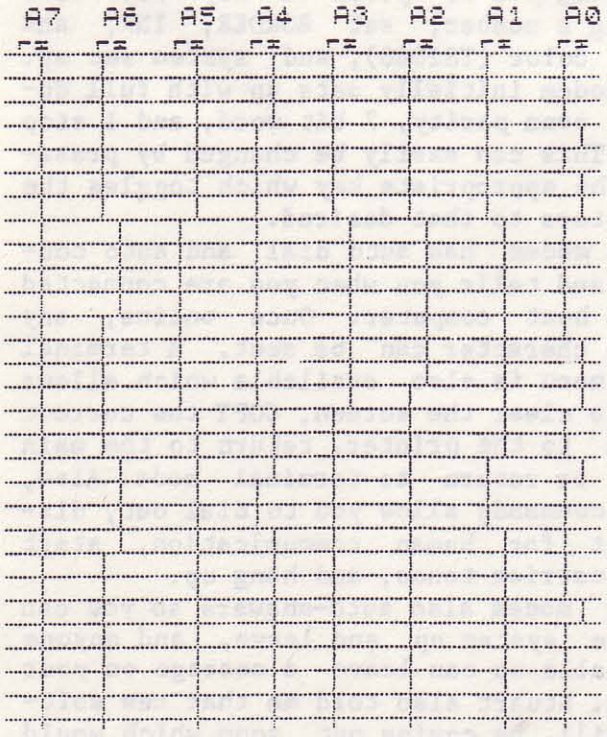


LOGIC ANALYZER

For my senior project in Electrical Engineering at the University of Florida, I decided to get to know my 2068 a little better. I started dreaming up useful ideas that my instructor would think would be hard enough to be worthwhile to spend a whole semester on designing. There are dozens of things to build to add on to it, but after looking at the possibilities, I decided on an unusual idea after seeing a $12,000 logic analyzer by Hewlett-Packard. I was going to build a logic analyzer controlled by my 2068.

My first thought was to memory map the incoming data, which I had done before with my ZX81, but I realized that there was not any free memory to 'map' to. Then I remembered the IN and OUT commands that grace the new keyboard, and started researching this scheme.

I found the IN and OUT commands to work very well and was able to take a 2K memory chip (the popular 6116 2K x 8 static RAM), clock it at 8 mhz while reading in the desired data, slowly read it into the 2068 which takes the data and converts it to high and low marks (as shown below) and displays it on the screen and prints it out on the printer.



With this, you can tell when what happens with respect to data control lines, memory addressing, and other logic functions. The timing diagram of an arbitrary set of addresses in the 2068 are shown below. The vertical marks are 125 micro seconds apart, which is the resolution of the analyzer (1/8 mhz).

-- Joe Williamson

SOFTWARE REVIEW: VOICE CHESS

One of the software packages recently introduced for the TS2068 is "Voice Chess" by SoftSync. Available on cassette, the program loaded easily and utilized well the features of the computer.

Seven levels of play are available with the computer taking from 2 seconds up to seemingly forever to make its move, depending on the level you choose. After selecting your level of play, you select the color of your side, black or white, and play begins.

And now the exciting part begins -- the computer talks to you! Each time you type in your move or the computer moves, it tells you the move made. In addition it occasionally will throw in phrases such as "I expected that" or "Uh, Oh". Using the sound synthesizer (I assume) in the machine, the voice is rather limited in its range, sounding much like the voice of the Speak & Spell by Texas Instruments. Since the sound plays out through the small speaker mounted on the bottom of the TS2068, a better and louder sound can be had by connecting the MIC output of the computer to the MIC input of the cassette recorder, pressing play and pause and adjusting the volume to suit. Be sure to unplug the EAR cable into the recorder. If you have a tone control, set it towards the bass for a clearer sound.

So much for the "voice"; what about the "chess"? Not being a veteran player, I am not able to say how tough the machine is, but I never beat it at level 1. The graphics of the board and pieces is good but a little blurry in color on every TV tried.

Criticisms: the documentation -- one sheet of paper -- is inadequate in several respects. Most importantly it omits to tell how to abandon play in progress and

begin a new game without reloading the tape. Another disconcerting part of the game is the computer's refusal to let you make a move that would allow its Check to become Checkmate and so end the game. The tinny voice would declare "Illegal Move" and wait for you to move again.

I enjoy this game a great deal and expect that its limited use of the sound capabilities of the TS2068 is a preview of greater things to come.

Recommendation: BUY.

-- Richard Cravy
April 1984

NEW TS2040 PRINT STYLE

You may have noticed that the print appears to be denser than the standard print from a TS2040 printer. You will notice that the characters appear wider. Well, thanks to Dick Scoville of the Triangle Timex Sinclair User's Group, you can make the letters on your screen darker by using a short routine. You can COPY it to the printer as was done here for darker print. Load the rooutine and RUN it; then call it with RAND USR 62608 after printing something to the screen:

```
10 CLEAR 62607
20 FOR N=62608 TO 62621
30 READ A
40 POKE N,A
50 NEXT N
60 DATA 33,0,88,43,124,254,64,216,126,31,
182,119,24,245
```

I use the above program and make the USR call just before copying the screen. In playing with it, I found that you can keep darkening the characters 2 to 3 times by calling it several times. You get some very interesting fonts!

-- Joe Williamson
May 1984

TS2050 MODEM

I ordered the Timex 2050 modem back in January hoping I would get it in time to use in a class I was taking at the University of Florida. Of course I never saw it during that time. Finally I called Timex and was told that Westridge Communications in Marina Del Ray, CA had a compatible unit. I called Westridge and spoke to a man named Stuart. He told me that they, in fact, have the actual Timex unit and were selling it with their name on it instead of Timex's because Timex broke their contract after calling it quits.

Skipper Electronics ordered several units to see how they went, and I got one of the first in. The unit includes the modem, power supply, 28 page manual, software, and information for subscribing to Compuserve and The Source.

The connector has a piggyback connector on it like the 2040 printer and is silver in color. The 2040 printer fits perfectly on top; the unit measures 7 3/4 by 6 1/4 by 1 1/2 inches and a 12" shielded ribbon cable between the connector and the unit. The front is black with a data on light to the left. It uses the same power supply as the 1000/1500 and provides two modular connections; one for the wall and one for your phone. The cassette includes software for the 2068 on one side and for the 1000, ZX81, and 1500 on the other.

The manual gives step by step, easy to understand instructions for setting up and using the modem. Once the software is loaded, a menu appears on the screen directing you to press a key for auto dialing a number, set BORDER, INK, and PAPER color (TS2068), and system set up. The modem initially sets up with full duplex, even parity, 7 bit word, and 1 stop bit. This can easily be changed by pressing the appropriate key which toggles the parameters to that desired.

The modem has auto dial and auto connect and tells you when you are connected with a host computer. Once online, any ASCII character can be sent. A terminal mode menu is also available which allows you to clear the screen, COPY the current screen to the printer, return to the main menu, or return to terminal mode. Also, modem commands allow you to dial out, disconnect for human communication, start modem carrier tones, and hang up.

The modem also auto-answers so you can set the system up and leave, and anyone who calls up can leave a message on your screen. Stuart also told me that new software will be coming out soon which would

allow uploading and downloading of programs and possibly 64 characters per line!

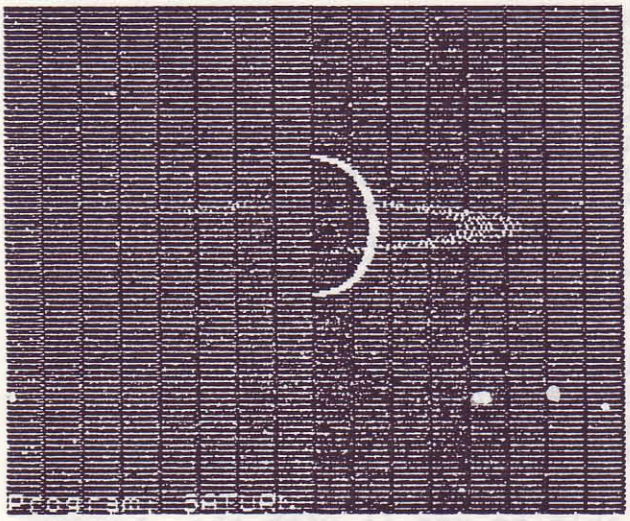
-- Joe Williamson
June 1984

FAR SIDE OF SATURN

I was trying assorted plots with my 2068 when I noticed that one of them looked like part of the rings of Saturn. At that moment I ttought, "Why not write a program that draws Saturn?" After a little playing around, I decided it needed to have Cassini's division. A solid ring did not look like the Voyager photos, so Z$ was needed. Z$ instructs the program what to plot and what to leave blank. The print statement keeps stars from showing under the planet and shadow the rings to give a view that can't be seen from Earth. To get the printer copy to show black sky, the screen had to be filled up and then the INVERSE command was used.

Run the program and press any key when you have enough stars. Saturn will then be drawn. Impress your friends with the graphics on your 2068; run Saturn!

-- John Monkus
June 1984




```
  10 REM SATURN
  20 REM by John L. Monkus
2000 REM stars
2180 PAPER 7: BRIGHT 0: BORDER 7
: INVERSE 1: CLS
2200 FOR I=0 TO 21: PRINT AT I,0
;"
  ": NEXT I
2210 LET a=INT (RND*175)
2220 LET b=INT (RND*255)
2230 INVERSE 1: PLOT b,a
2240 IF INKEY$="" THEN GO TO 221
0
6000 REM Saturn
6100 INVERSE 1: INK 9
6150 LET Z$="                100100
10000010101001001001001000010001"
6200 PRINT AT 7,14;"      ";AT 8,
13;"        ";AT 9,13;"        ";AT
10,13;"        ";AT 11,13;"      "
;AT 12,15;"    "
6205 FOR Z=10 TO 40
6210 FOR X=40 TO 84
6220 FOR Y=0 TO 8
6240 IF Z$(50-Z)="1" THEN PLOT X
+Y*Y-Z+X,Y+100
6242 IF Z$(Z)="1" THEN PLOT X-Y*
Y-Z+X+146,Y+100
6250 NEXT Y
6260 NEXT Z
6266 FOR Z=0 TO 30
6268 IF Z$(Z+10)="1" THEN PLOT 4
0+Z,99
6269 IF Z$(50-Z-10)="1" THEN PLO
T 187+Z,99
6270 NEXT Z
6290 FOR Z=10 TO 40
6300 FOR X=40 TO 84
6310 FOR Y=0 TO 8
6320 IF Z$(Z)="1" THEN PLOT 147+
(X-Y*Y-Z+X),Y-98
6340 IF Z$(50-Z)="1" THEN PLOT (
X+Y*Y-Z+X),Y-98
6350 NEXT Y
6352 NEXT Z
6360 PRINT AT 8,13;"  "
6365 FOR Z=0 TO 3
6370 PLOT 127+Z,75
6380 DRAW 0,48,PI
6382 NEXT Z
6390 PRINT AT 9,5;"      ";AT 10,
5;"          "
6500 BORDER 7: INVERSE 0
9998 STOP
9999 INK 9: PAPER 0: PRINT AT 20
,0;: SAVE "SATURN" LINE 200
```

Word Processing for the 2068
— Tasword II —

I work every day with both word processors and computers. As a result I have pretty high expectations about what both should be able to do. Frankly, until now I have been disappointed with what has been available for the TS2068.

What is a "word processor" all about anyway? A word processing program should allow your computer, when equipped with a suitable printer, to offer the best features of a typewriter combined with the ability to modify, change, save, reprint, and otherwise work with the letter, report, or document you are producing. To me, such a program should require little or no programming knowledge and should be easy to learn and use without a constant reference to the manual.

Enter TASWORD TWO. This is a program originally available on the Spectrum and recently adapted for the TS2068. Produced by Tasman Software it is available in the U.S. from Ramex and Phoenix (addresses at end of article) for $49.95. Although this is double the price of the English version, I do believe its utility makes it worth even that price.

Tasword comes in a black plastic case about 6 x 9 inches with a 20 page manual. It loads easily in about a minute and signals its beginning with a beeping tone. The user is immediately presented with an empty screen with a small blinking cursor in the upper left corner and a single row informing of the current parameters across the bottom. Displayed are the line and column the cursor is on, whether or not right hand justification is on, and a friendly reminder that pushing "Edit" (shifted 1) brings you onscreen help.

Instead of immediately beginning you can proceed to the TUTOR file which follows the main program on the tape. This easy to use and informative section leads you through the whole program by have you do as you read. Do this first and then read the manual; it will make a lot more sense if you do.

One thing you notice immediately in the Tutor section or on the screen should you go immediately to word processing is 64 CHARACTERS PER LINE ON THE SCREEN! Tasman has accomplished this by redefining the entire character set using a 3 x 7 matrix for each character instead of the usual 7 x 7. The result is very effective though 'm' and 'w' are a little hard to read. As a result of the 64 column lines, what you see on screen is more nearly what you will get on your printer plus it WORKS JUST FINE ON YOUR TV since no more resolution is used than in the 32 column mode. Great job, Tasman!

The program is FAST and EASY. All the usual functions are there -automatic justification, block move and delete functions, automatic centering. Control codes can be placed in the text to obtain the special features your printer might offer. Since the TS2068 has no special function keys like some machines, various commands are given in the program by using black symbol shift functions (like "at" and "step") and the extended mode (cap shift + symbol shift) and various keys. It is very nifty and sensible so easy to remember.

I run my Tasword with the Tasman parallel interface, though several others made in Europe are also listed in the manual which work with it. Phoenix is also supposed to have one that works. I have also been able to use it with the Aerco interface -- see the accompanying article for more information.

All is not roses unfortunately. The program does have its limits. There is no paging ability. Reformatting is very limited, especially

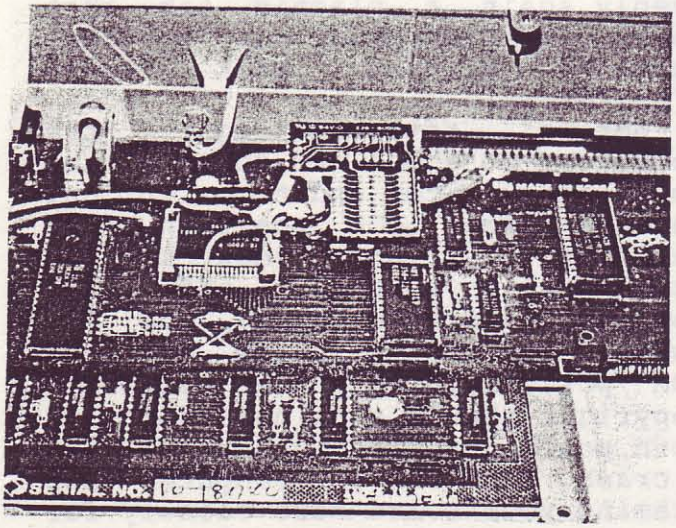
Spectrum Emulator

One of the biggest drawbacks of the 2068 is the selection of software available for it. Timex pulled out a bit too soon before a good selection of software became available. With the project I describe here, You can run many Spectrum (48K) programs on your 2068 (ones that normally don't run on your 2068)!

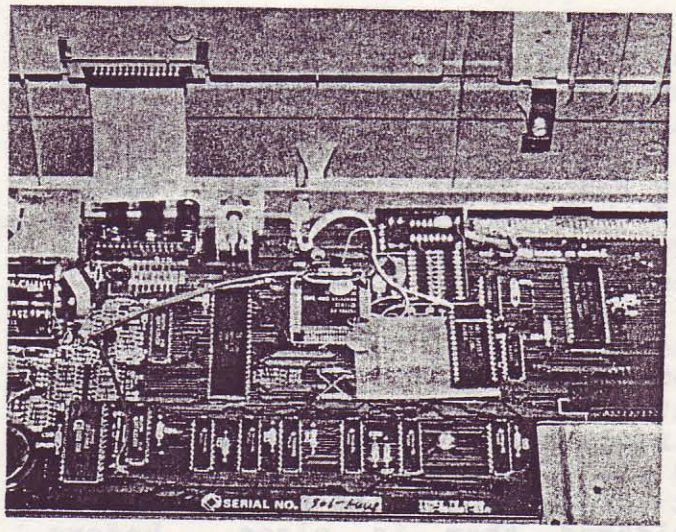
>>WARNINGS<< Do not attempt to make this your first project. It requires going inside the machine and removing an IC chip and replacing it with the board described here. Also remember that going into your machine probably will void your warranty.

Basically, what we're doing is replacing the 2068 ROM with the Spectrum ROM, which is all that you would have to do if you don't want to change between the two operating systems very often. The board that I describe here switches between the two ROMs so that you have immediate access to both operating systems at a flick of a switch.

The circuit board and schematic along with the pictures show the board, where it goes and how to make the necessary connections. Pin 27 is the chip select for the NEC ROM used by Timex and later model Spectrums. An earlier Hitachi Rom was used in the Spectrum and both machines allow the use of either ROM (the NEC and Hitachi ROMs have their pin 27 and pin 20 reversed). I take into account only the NEC ROM which should be the only one found in current 2068's and what is presently available for the Spectrum. The way you can tell is by the wire links used to the left of the Timex ROM (U16). The NEC ROM uses W1 & W2 shorted, and the Hitachi ROM uses W3 & W4 shorted. The ROMs are wired in parallel except for pin 27, which is wired as shown in the schematic. ROMCS (active low) comes from the ULA chip and selects the ROM when needed by going to a low state (0V). The switch selects the desired ROM by connecting ROMCS to that chip. The resistors, R, pull the unused ROM up to a high state (5V) so that it will remain inactive. Although probably not needed, C takes care of any transients (I feel better with it there). I used 10K ohm resistors, but anything from 4.7K to 10K can be used. Capacitor C can be 0.1 uF to about 4.7 uF, preferably tantalum.



Before...



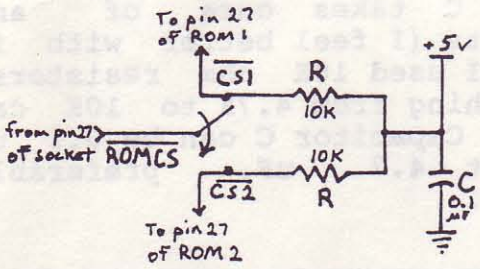
...and After Installation

Care must be taken when removing the chips and inserting them. The pins bend very easily and the chips are very static sensitive. One of the chips (I chose the 2068 ROM) needs to be mounted from the foil side and soldered in place. The other chip can be socketed. Room prevents the foil side ROM from being socketed.

Making the board can most easily be accomplished by taking the layout given here and having it copied onto clear acetate and then using a photo sensitive PC board (available at your local electronics shop), expose with your clear acetate copy and develop and etch following the instructions given with the process. All parts should be readily available.

BEFORE YOU START ANYTHING, UNPLUG AND DISCONNECT EVERYTHING FROM THE COMPUTER.

To assemble the board, first remove the seven screws securing the bottom of the computer and



carefully lift the top up till you see the keyboard connector, then carefully pull out the flatlead wire from the socket on the board. Now remove the Timex ROM, marked U16, (be carefull not to bend any of the leads) and place it in a piece of static foam.

From the picture, you can see that pins are required to stick down from the foil side to slide into the socket present on the 2068 circuit board. I used a three level 28 pin wire wrap socket and stuck it through the board about 1/4" and soldered them in place before clipping the leads from the top, through the center set of 28 pin holes. Next, install a 28 pin LP socket into the holes just offset to the right of the pins mounted before. Now stick the protruding pins into a piece of anti-static foam and mount the Timex ROM into the remaining holes taking care to allign pin 1 with the hole marked pin 1. Solder the resistors and capacitor in place and run three wires to a SPDT switch with the ROMCS wire going to the common of the switch and the CS1 & CS2 wires going to the outer tabs of the switch. I mounted the switch in the rear of the computer and physically set it so that the up position is for the Timex ROM. Check to make absolutely certain that there are not any solder bridges between any of the traces on the board.

Once you are sure that everything is OK, remove the anti-static foam from the pins and insert into the ROM socket on the 2068 board taking care to align pin 1 in the proper place (facing from the front of the computer, pin 1 will be left rear of the socket. The chip facing down will be to the left, as in the picture. Insert your new ROM into the socket of the Spectremulator with pin 1 in the same position as just mentioned. Mount the switch in a convenient place. Be carefull drilling into the case. For the top to sit down evenly again, a plastic tab that hangs down from under the keyboard must be clipped back about 1/8-1/4".

Before re-assembling the computer, go ahead and connect the power and monitor and turn it on. In the Timex ROM position, the familiar copyrights show up as usual. Allways turn off the computer before switching the ROM switch. Now try it in the Spectrum ROM position. Only the Sinclair copyright should show up! If one or both positions produce nothing but a crash, turn off the computer and examine your board more closely for shorts or breaks in the traces. Once you have it working properly,

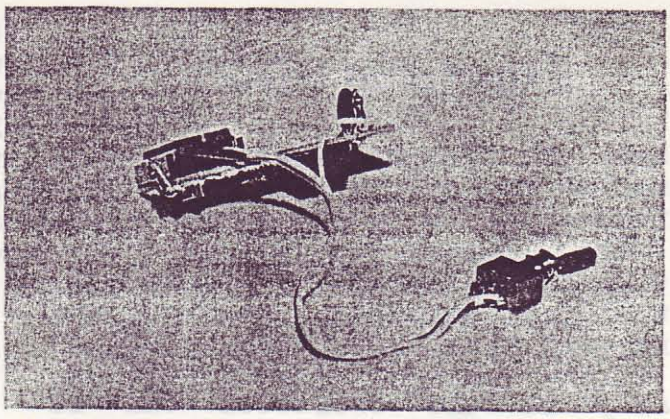
reassemble the computer taking care to gently re-insert the keyboard connector.

Once you are in the Spectrum mode, You will notice some differences in the operating system. FREE has been changed to: ~, STICK is now: |, ON ERR gives only: {, SOUND gives only: }, RESET gives only: @, and the word DELETE no longer appears. (Several of these characters do not print on our daisywheel printer.) Also the annoying stop-before- delete at every semicolon and line number is gone. Even though these commands are gone, they can still be used or made using IN & OUT and short routines. The joysticks still work with programs like Flight Simulator and Cyberzone while in the Spectrum mode. Sound can also be made using OUT and POKE (more on this next month). The command cartridge port does not work when in the Spectrum mode either. Otherwise, everything works exactly the same.

Things that do work include the 2040 printer and the 2050 modem. As far as software for the Spectrum is concerned, we have tried about seven that don't work on the 2068 but do work fine with the 2068 with the Spectrum ROM inside. They include all the software from Tasman (Tasword Two, Tasprint, & Taswide), Microprint 85 (you must CLEAR 65535 before loading) Pengy, Pool, and Cascade (contains 50 programs-some of these do run on the 2068). We have not found any that don't work yet. Just make sure that the software is for a 48K Spectrum. We will continue to order (and rent) software from Europe and keep you informed as to what we have found to work and is worth having. The Spectrum ROM is available from FOOTE SOFTWARE (see ad this issue) for $20. For software, check any British computer magazine you can get. They generally all list some titles.

With this addition to the 2068, you can open up a whole new avenue of support for your computer. With this we hope to be able to determine which peripherals for the Spectrum will operate on our 2068s including the microdrives now available in England!

-- Joe williamson



Spectremulator Board — Spectrum Rom is on the left and 2068 Rom below and on the right.

Software Review

Jack Deuber has 10 programs out for the 2068 and has done a fine job on GOLD!. All in Basic, but fast. Good use of user defined hi-res characters.

You start out with five miners at the top of the screen near the assay office. Below is the ground as an all black screen with veins of gold here and there. To get to the veins of gold, you must blast away the dirt. Be careful, because after each blast, the dirt settles and it could fall on you and kill you. You get 10 blasts, after which you take all the gold you have collected to the assay office to collect your money. You need to maximize your collection of gold to win the game, so you must think about each blast as to how much gold you can get to.

All in all GOLD! is a fun game which will amuse you for hours. The program makes good use of sound, and the joystick makes it easy to use. A good deal for $8.00. Jack Deuber Software, PO Box 305, Casselberry, FL 32707.

-- Joe williamson

Expanding UDG's

Have you thought that when you wanted to print a pattern using user defined graphics on the screen that you were limited to placing that pattern on the screen in multiples of the pixel dimensions (8x8) of the character? True in the horizontal, but in the vertical dimension, the tyranny of the character can be overcome as illustrated by this little program called "EXP II".

EXP II pokes the value of the UDG start address for the user defined graphics table. The program scrolls the pixel patterns of the USR graphics. By printing characters that are next to each other in the character set on top of each other on the screen, the graphic character changes position a pixel at a time. This allows smoother movement of graphics on the screen.

The graphic character can be any number of characters high. For a pattern that is more than one character in width, a buffer or blank character is placed between the series of characters that are printed on top of each other. Notice the setup of the characters in EXP II. The small duplicate listing is to show which UDG characters are used in the print statements. This was made by listing line 8200 and then in direct mode, print to the screen and then COPY.

I hope that you find EXP's principle useful in developing your own moving graphics programs. This one had me scratching my head for days, but every time I thought about it, it became more beautiful.

One other thing this opens up is that you can also have more than one user defined character set. The UDG's initialize at memory location 65368 and occupy 168 bytes (21x8). Another set could be stored 168 bytes below this starting at 65201. These starting addresses are stored at 23675 and 23676. Initially 23675 holds 88 and 23676 holds 255 (255*256+88=65368) for starting address 65201, POKE 23675 with 177 and 23676 with 254 (254*256+177=65201). To utilize this, all you have to do is keep track of which UDG set you are working with when defining the sets and when you print them. You can make as many UDG sets as you have memory for.

--John Monkus

```
8200 PRINT AT 6,16; OVER 1;"ADG"
;AT 7,16;"BEH": IF Y<65359 THEN
PRINT AT 6,19; OVER 1;"J";AT 7,1
9;"K"
8210 IF Y<65368 AND Y>65335 THEN
 PRINT AT 8,16; OVER 1;"CFI"
8220 IF Y<65356 AND Y>65335 THEN
 PRINT AT 8,19; OVER 1;"L"
8230 RETURN
```

These lines are to be entered first since they identify which characters are UDGs in their graphics mode.

```
  10 REM EXP II
  20 REM 8-27-84 BY J. Monkus
 990 BEEP .25,16
 999 STOP
8000 CLS
8010 LET X=0: LET Y=65368+X: GO
SUB 9560: GO SUB 8200
8040 PRINT AT 6,14; OVER 1;"
;AT 7,14;"
8060 IF INKEY$="D" THEN GO SUB 8
200: LET X=-1: GO SUB 9560: GO S
UB 8200
8070 IF INKEY$="U" THEN GO SUB 8
200: LET X=1: GO SUB 9560: GO SU
B 8200
8080 IF INKEY$="9" THEN GO TO 99
0
8090 PRINT AT 20,8;"
MNOPWRSTU";AT 21,8;"ABCDEFGHIJKL
MNOPQRSTU"
8100 GO TO 8050
8200 PRINT AT 6,16; OVER 1;"
;AT 7,16;"
PRINT AT 6,19; OVER 1;" ";AT 7,1
9;" "
8210 IF Y<65368 AND Y>65335 THEN
 PRINT AT 8,16; OVER 1;"
8220 IF Y<65356 AND Y>65335 THEN
 PRINT AT 8,19; OVER 1;"
8230 RETURN
8998 STOP
9000 POKE 23658,8: RESTORE
9010 FOR J=144 TO 154: FOR I=0 T
O 7: READ C: POKE USR CHR$ J+I,C
: NEXT I: NEXT J
9018 DATA 0,0,0,0,1,2,4,8
9020 DATA 8,12,10,9,4,2,1,0
9024 DATA 0,0,0,0,0,0,0,0
9028 DATA 0,0,0,BIN 00111100,BIN
 11000011,0,0,0
9030 DATA 0,0,0,BIN 11000011,BIN
 00111100,0,BIN 11000011,BIN 001
11100
9032 DATA 0,0,0,0,0,0,0,0
9034 DATA 0,0,0,0,128,64,32,16
9036 DATA 16,48,80,144,32,64,128
,0
9038 DATA 0,0,0,0,0,0,0,0
9040 DATA 0,0,0,0,0,0,0,0
9042 DATA 0,0,0,0,0,0,0,0
9498 GO TO 8000
```

```
9500 PRINT PEEK 23675+256*PEEK 2
3676
9550 STOP
9560 LET Y=Y+X: POKE 23675,Y-256
*INT (Y/256): POKE 23676,INT (Y/
256)
9570 RETURN
9998 STOP
9999 SAVE "EXP II" LINE 9000: VE
RIFY "EXP II"
```

ABCDEFGHIJKLMNOPQRSTU

This should appear on your screen when the program begins to run. This also allows you to see that, when entering the program, Graphic A/Graphic D/Graphic G yields the little design reproduced on line 8040 of the program.

Horace...At Last!

A common complaint in the microcomputer field is that those who make the hardware don't know how to write the software. This adage has largely been confirmed by Timex, whose software for the 1000/1500 series seldom came up to the same quality level as packages from independent suppliers. This same problem has also been evident with the 2068 software.

But at last I have gotten my hands on three programs that really can make you glad you left your Atari 2600 behind. They are the "Horace" games Timex made available for the 2068 shortly before they left the market but which many dealers never stocked. I was able to purchase mine from Games To Learn By (address at end of article) at very reasonable prices.

Horace, long popular with Spectrum owners in England, is almost unknown here. Horace somewhat resembles one of the ghosts in the Pac-Man game with legs. But the programmers have done far more with him than the ghosts have ever done.

HUNGRY HORACE apparently is the oldest of the three games and is the simplest. It operates much like Pac-Man but has more challenge than the other 2068 maze type games I've seen. It's entertaining but is not my favorite. However, my 3 children (ages 13, 11, & 9) play it the most.

HORACE GOES SKIING opens with a screen in which Horace must cross an 8 lane busy freeway to rent his skis and then return. This is similar to part of the popular Frogger arcade game. After procuring his skis, he begins to ski, avoiding trees which will break his skis (requiring another trip across the freeway) and trying to slalom back and forth through the flags to score points.

If he can pass under the finish banner at the bottom he scores additional points. Finishing one slope means crossing the freeway again to get to the next slope. This is my favorite. The sound, movement, graphics detail and sheer challenge are great. I brought this one along to our last users group meeting and everyone was taken with it!

HORACE AND THE SPIDERS is the most complicated and most challenging. Three screens are presented. In the first Horace must cross a large open space while jumping over a spider and then climbing a small hill. This immediately switches Horace to a scene in which he must cross a canyon by swinging from one spider web rope to another while the spiders overhead are busily pulling the ropes up (here's where I fail). Crossing the canyon he enters a black forest with spiders and webs everywhere. Horace is to set about stomping holes in the webs and then pouncing on the spiders which come to repair them. They are destroyed if he can step on them and make them fall through the holes to the ground below. Since I have never gotten past this part, I'm not sure what comes next. Again, great graphics

and sound with a refreshing change in theme from the Pac-Man and Space Invaders fare.

Though I primarily use my 2068 for its educational value and for word processing, Horace does have his place at my home. Buy at least one and see if you don't agree.

-- Richard Cravy

Newsletter Changes

Our Timex Sinclair Users Group began here in Gainesville in September 1982. The newsletter started out as postcards sent out to a handful of people telling them when the next meeting would be. It slowly grew to a one page, then a two page, and finally to a long time standard of a four page newsletter, with the last one being a six page one.

Back in March when Timex quit, it looked uncertain as to the future of our computers, user's group and the newsletter. It appeared as if everything was going to dry up. The last few months have shown a dramatic turnaround in user awareness and an increase in members of our user's group here.

Just in the past month we have received more inquires about our group and newsletter than we have in the past two years! For the last newsletter, we sent more out of town and state than locally.

With this in mind, Richard Cravy and I have decided to change the newsletter into a magazine type of format with a regular subscription rate of $12 per year, and a trial subscription of $6 per half-year. Current members of TUG will receive the magazine as they always have. (More details at next meeting.) Single issue price will be $1.50 and available only at Skipper Electronics for now. SUM is no longer associated with Skipper Electronics, other than being sold there.

Pokes for Aerco-Tasword

In running my Tasword Two word processor, I was frustrated that I was not able to use my Aerco centronics parallel interface with it. None of the modifications used with various other interfaces listed in the Tasword manual worked with the Aerco. Finally, I got desparate -- I called Aerco in Austin, Texas. THEY HAD THE INFORMATION I NEEDED.

To run Tasword with the Aerco, first load the Aerco software then the Tasword Two program. Once into Tasword Two, get into basic by holding down on the 'symbol shift' then pushing 'STOP'. This will give you a menu, one item of which is to go into basic. Follow the directions given on the screen.

Once in basic enter the following Pokes with no line numbers before them and pushing enter after each one.

```
POKE 57999,127
POKE 58001,103
POKE 58008,127
POKE 58014,219
POKE 58015,127
```

Now push RUN to return to Tasword. Your Aerco interface should now print out your files as the program calls for it to.

AERCO, Box 18093, Austin, TX 78760; 512/331-0719. Interface sells for $69.95 and includes the software to drive it.

-- Richard Cravy

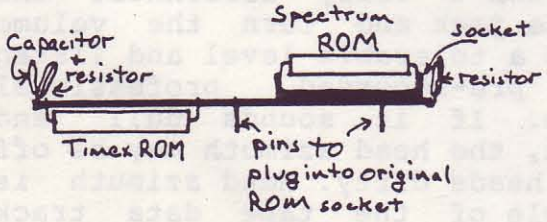
```
**********************************
*                                *
*  You know we live in a meche-  *
*  nized society when you pick   *
*  up your calculator and try to *
*  change the channel on your TV *
*                                *
**********************************
```

Spectrum Emulator Revisited

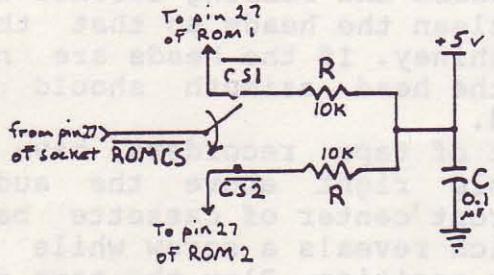
In last month's article, we inadvertently left out the printed circuit board layout, so here it is this month with our apologies. Also I have drawn a side view showing how the chips sit on the board.

When installing the chips, always use great care in positioning the chips in the sockets. Generally, the width between the two rows of pins are wider than the socket spacing. To narrow the spacing, hold the chip with both hands, fingers holding top and bottom and press one of the rows of pins on their side onto a hard surface with the pins still in the protective foam. Carefully bend in both sides slightly until the chip is easier to fit into the socket. The outward bend of the pins help "force" a good connection to the socket, so don't over do it.

The foam is there to protect the chip from static discharges. Keep the chip in the foam as long as possible. Remember, the drier your climate, the more chance you have of

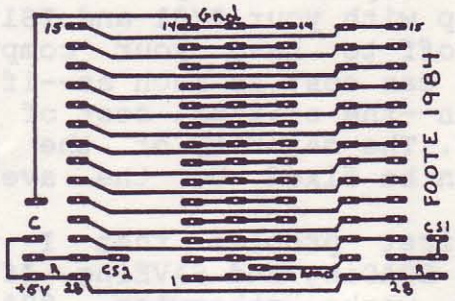


Front view of completed circuit board with both ROMS mounted.



Schematic of Spectrum Emulator

static damage. Don't forget to protect the chips you take out such as the 2068 ROM. Your best bet is to stick it in the other side of the foam your new ROM is in. Also remember that in any work you do with any of your computers, you are working with static sensitive components; so be careful.



Printed circuit layout for Spectrum Emulator.

Sometimes the Spectrum ROM has a hard time initializing. You can tell from the start if it will or won't. If the screen BORDER initializes white then no problem should occur. If the BORDER initializes black, go ahead and turn off the computer and try again. For me, it has trouble initializing about 20% of the time.

--Joe Williamson

FLASH!
POKES FOR SPECTRUM ROM TASWORD WITH AERCO

First load Tasword II program. Get into BASIC by holding down on the 'symbol shift' key and pressing STOP. Select Basic from the menu then type in the following pokes without line numbers, pressing enter after each line.

```
POKE 57999,127
POKE 58004,98
POKE 58008,127
```

Also, these pokes are for the early version of Tasword written for their interface "A" type. The type "B" interface is presently being sold here, as well as in England. If you need to use the "A" version with the "B" type of interface, break into basic, POKE 57999,191 and save this version for future use.

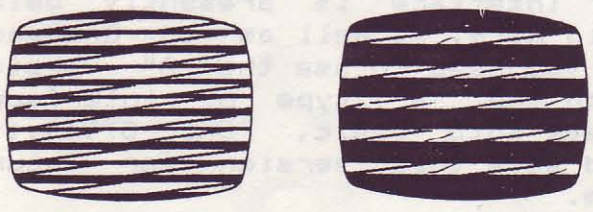
Now return to Tasword II with RUN and ENTER. Save your new version of Tasword II as offered by the same menu which got you into Basic.

ZX/TS Repair Guide — Part I

This begins a series of articles on how to repair the problems that spring up with your ZX81 and TS1000. Sending off to have your computer repaired can cost as much as--if not more than--the original cost of the computer. The majority of the problems can be fixed by the average owner.

The first problem that I will cover is LOADing and SAVEing. If the computer works otherwise, 99% of LOADing/SAVEing problems lie in the cassette recorder you are using. The ZX/TS machines have one of the poorest (and slowest) ways of loading a program. You have no idea whether the program is actually loading or just passing what it thinks is garbage.

Most problems are caused by not having the proper volume setting while loading. One of the best ways of telling whether the program is loading or not is by watching the TV screen. The proper volume setting can be determined by watching the black and white lines on the screen during the more "steady scenes". The black lines should be slightly thicker than the white lines in between. On some sets with bad linearity, the lines may appear to get thinner towards the bottom of the screen (the display appears to be smaller towards the bottom as well). On these sets, try to watch the top few lines to make the black lines thicker than the white ones. That should give you proper volume for loading (typically around 3/4 of maximum volume).



Left screen shows volume too low; right screen shows correct volume.

The type of recorder is very important. Use only a standard type monaural recorder. Don't use stereo portables, home type units or micro-cassettes, they probably will not work. Your best bet is to use a good quality desk-top recorder which includes a tone control, tape counter, and its own power supply (generally in the $35 to $50 range). We have found that Panasonic recorders work with good results. Timex's works well and now Sears has a model out that looks identical to the Timex 2020 recorder.

Don't use a recorder from the closet that has been sitting collecting dust--it probably won't work. Have the recorder cleaned and belts replaced first before trying it. After sitting so long, the belts develop flat spots and cause an uneven speed, and dust can gum up the mechanism and cause the machine to eat your new tape. A recorder in good condition is a must.

Tone is another important factor to consider. If you have a tone control, be sure and place it in the highest position possible.

If after trying all this and it still won't load, disconnect the earphone jack and turn the volume down to a tolerable level and listen to a pre-recorded professional program. If it sounds dull and muffled, the head azimuth may be off or the heads dirty. Head azimuth is the angle of the tape data track with respect to the pickup on the head (should be parallel: zero degrees). For dirty heads, take cotton swabs and rubbing alcohol and gently clean the heads so that they appear shiney. If the heads are not dirty, the head azimuth should be adjusted.

A lot of tape recorders have a small hole right above the audio head (front center of cassette basket) which reveals a screw while in the play position. Play the tape and use a jeweler's screwdriver to turn the screw. You should hear the "muffledness" change. Adjust for the most "shrill" sound possible

(produces the most highs). If you don't have a head azimuth adjust hole, take it to a service center and have it done.

You should be able to now load without any problems. If not, play a tape and see if you hear any wavering or a stop and go type of sound. If you do, have it serviced, or buy another recorder (the motor may be going). If it sounds fine, then check all your connections, try another tape, have only the ear plug connected for loading and the mic plug connected for saving (remember, its ear to ear and mic to mic). If problems still persist, try another recorder on your computer or your recorder on another computer and ascertain which is the problem.

Once you have the loading of a prerecorded tape down, saving should also work. After you save a program, play it back with the mic plug out and make sure that something went onto the tape. If not, check your connections, and/or try another recorder. If playback of a pre-recorded tape is fine but playback of your recorded tape is muffled, have the heads de-magnetized and cleaned.

Everything in this particular article also pertains to the 2068. Although loading problems do not occur as frequently, they still do occur with the color computer. Head azimuth is a little more critical due to the faster transfer of data. Tapes come to you with varying levels of quality and may have been recorded on a recorder with head azimuth slightly different than yours. Some hard to load tapes can be loaded by adjusting the head azimuth slightly.

— BUGABOO —

BUGABOO is an arcade quality game for the TS2068 which has been con-
rted from the Spectrum. It is, or
s, one of the most computer games in England and is sold in the USA by Quicksilva for both the 2068 and the Commodore 64.

Bugaboo, we are informed, is a flea who falls down a hole into the depths of the earth. He is limited in his movements to diagonal left and right moves--which are produced by the "1" and "0" keys. The screen can be scrolled using the arrow keys. Bugaboo moves about in a three screen wide by three screen high chamber filled with ledges, cliffs, plants and spiders. And let's not forget the Pterodactyl -- the flying miniature dinosaur who suddenly swoops in & grabs Bugaboo to end the game unless our little lost flea can quickly hide under a ledge out of reach.

Upon loading, the game waits about 15 seconds for instructions; if none are given, a demo begins showing Bugaboo jumping about on the surface of the planet and then falling into the depths below. No scoring as such occurs--the goal being to escape. However, a timer is constantly running at the bottom of the screen as well as a "level indicator". The bottom of the hole is level 82, the surface 1. Bugaboo reaches the surface by jumping from ledge to ledge. This can be frustrating since missing a single ledge may well land you back on the bottom (remember the Pterodactyl).

The color and action is very good, and the game is almost as addictive for me as Pacman. With games like this, it is no wonder the Spectrum has been such a favorite in England. The 2068 version retails for $24.95 and the Spectrum version sells for $19.95 (we assume it will run on a 2068 with Spectrum rom). Quicksilva, Inc., 426 West Nakoma, San Antonio, TX 78216. Tell them you saw it in S.U.M.

-- Richard Cravy

— VIEWord —

VIEWord is the first in a series of software packages for the TS2068 being produced by Jim Clatfelter. It is to be followed by MAIList and BOOKeep. Considering the quality and simplicity of VIEWord, I am looking forward to these other two.

Considering the 32 character screen line that the 2068 provides, various word processors for this computer have taken different means to compensate. Tasword Two (SUM 8/84) redefines the character set so that 64 characters are visible on screen per line. M-Script (to be reviewed next month) uses the ultra hi-res graphics of the 2068 to give a real 64 character line. Another possibility is to incorporate a horizontal scroll which shows only 32 characters at a time but allows lines longer than 32; the screen then serves as a window on the text (as made popular on the Osborne computer). This last method is also an option on Tasword Two. However, VIEWord uses none of these more sophisticated methods. Instead it begins by asking how long a line you wish to print out on your printer (32-64 characters). Then, as you enter your text, a tone begins to sound as you approach your right margin and no more entries are allowed once your line length is reached. Pressing ENTER moves you to the next printer line. A blank line is placed on screen between each line to be sent to the printer.

Each printer line is numbered as text is entered to it. Any editing requires specifying which line # you want to edit. This differs from others which allow "full-screen" editing, but probably makes little difference in editing once you get use to either system. Something more critical is compensating for deletions or additions to a line. Words are not automatically moved down or brought up from following lines to compensate for changes made on a given line. But the two editing functions, WRAP and SPLIT, allow accomplishing this manually.

Commands are all single character entries with logical symbols--i.e., 'i' for insert, 'm' for menu, etc. All commands are entered at the beginning of a new line. In addition, a wide variety of printer control codes may be entered in the text to allow full use of your dot matrix or other printer.

Probably the real strength of VIEWord is in printer control. Auto numbering of pages, # of lines per page, single or double spacing, and such is all very easily done.

Here are the "negatives" I see with VIEWord. The screen display method only allows a small amount of your text to be visible at once. Right justification is not allowed for (though manually adding spaces within a line would accomplish it). Adding or deleting text is easy, but compensating for the resulting longer or shorter lines is a little tedious using WRAP and SPLIT. Lines longer than 64 characters are not permitted.

VIEWord's strengths are many. It is very easy to learn to use and the one key commands quickly learned. For those who have never used a word processor before, the 32 character line and line oriented editing will probably be no problem. The program has the Aerco interface software built in, and also allows output to the TS2040 printer. And the fact that two other packages will soon be introduced in this family using the same command structure will mean a lot to those who will use all three in a small business or for personal use. The documentation is not extensive (7 pages) but is clear and answers most questions. Lastly, the price is $25 -- half or less of that of Tasword Two and M-Script.

For someone who wants a simple but versatile word processor, this may be the one for you. VIEWord is available from the author for $25 postpaid: JIM CLATFELTER, 646 Corwin Avenue, Glendale, CA 91206.

-- Richard Cravy

Modem Tips

"TS 2050 Modem links you with a new world of opportunities" as an ad for Timex once stated, and its true! The Westridge 2050 Modem does link you with up to the minute information from just about everywhere. I know I get mesmerized staring at the screen communicating with a BBS or mainframe somewhere while my long distance phone bill creeps up at an alarming rate. Who says "long distance is cheaper than you think" anyway?? They obviously don't own a computer with modem.

Fortunately most of the work I do is local anyway, and The Source and Compuserve both have local numbers in larger cities - be sure and check. If you have call waiting, you need to get rid of it or have another phone line installed.

When call waiting beeps on your line while using the modem, you can usually count on spurious characters or a crash. If you get locked up and have to turn off the computer to restart. Many times, depending on what type of system you are talking to, the host computer will not realize that you have left and go on waiting for you to send something. I have actually been cut off and dialed the mainframe back up and still be on line and in my account! I would hate to think what would have happened if someone else had dialed up in that time that I was off line.

The biggest problem that I have is seeing graphs on my 32 column display when the smallest display being sent is 64 column. Hopefully someone will come out with a modem program supporting the 64 column mode. I would even settle for 64 column printer output only.

Recently, while using a mainframe at the University of Florida, I discovered that there is no way to use caps lock, and all that the mainframe would accept is uppercase. To complicate matters, the system recognizes the 'break' command as a user abort command. So, while I type along on my 2068 holding the caps shift key down, I must remember to let up on the caps shift to space, otherwise I lose what I was doing. This would not occur on the 1000/1500 because they send Caps only.

The modem really is a good addition to your computer, and it does work well, and people are using it and finding ways to get around some of these quirks.

Users in the Timex Sinclair Users Group of Cincinnati have found a way to use a large printer (must have bit-mapped graphics i.e. Seikosha GP-100/Gorilla Banana, Star Gemini 10x, STX-80) with the 2050 modem and the Aerco Interface.

The modem software makes a call at 54025 and 54026 to copy the screen to the Timex printer. The copy routine in the Aerco software resides at 64628. All that is needed is to change the original call for the copy routine to the one in the Aerco interface.

First, load the Aerco printer driver software and configure to your printer. When the menu comes up again, choose the load option and load the basic part of the modem software ONLY by pressing break as soon as the "Program loading" appears on the screen and stop the tape. Now enter CLEAR 54015 and LOAD "aterm"CODE and restart the tape. Now add these lines to the basic modem loader program:

```
999 STOP
1000 POKE 54205,116
1010 POKE 54206,252
1020 POKE 64263,0
1030 POKE 64264,0
1040 POKE 64265,0
1050 RAND USR 64628
1060 SAVE "aterm" LINE 10
1070 SAVE "aterm" CODE 54016,8000
1080 SAVE "PRCODE"CODE 64256,1111
1190 STOP
```

After you have entered everything, place a blank tape in your tape recorder, set it to record and enter GOTO 1000 and follow the instructions at the bottom of the screen (there will be three saves, so don't wander off). You may want to rewind the tape and verify.

To try it out, TURN ON YOUR PRINTER FIRST - ALWAYS. Enter GOTO 10 to start the program and hit enter for the initialization header. Now press shift and 8 to get the lower screen menu and press P for a screen copy. If you forget to turn on your printer before you press P, the program will lock up, and you will have to turn off the computer and reload and hope that the host computer you were talking to knows you are gone.

I found that you must remove the case from around the modem connector in order to plug in the Aerco Interface (Its bigger than the opening allows). Due to the way that the modem rear connector is soldered, the Aerco Interface will go on crooked. Make sure that the connector is on as far as it will go and that nothing is shorting.

Thanks to the Timex Sinclair Users Group of Cincinati for this great tip. They can be reached at 11 Funston Lane; Cincinnati, Ohio 45218.

-- Joe Williamson

ZX/TS Repair Guide — Part II

This is the second in a series of articles on how to repair your ZX81 and TS1000. I will also try to cover some of the problems found in the 1500 and 2068 as well in future articles.

From my experience with the ZX81 & TS1000, I would say that there are four common problems with this series. They are the infamous 'RAM pack wobble', keyboard ribbon cable cracking, loose ground strap, and 5 volt regulator over heating and failing. I have seen other problems crop up, but these are by far the most prevalent.

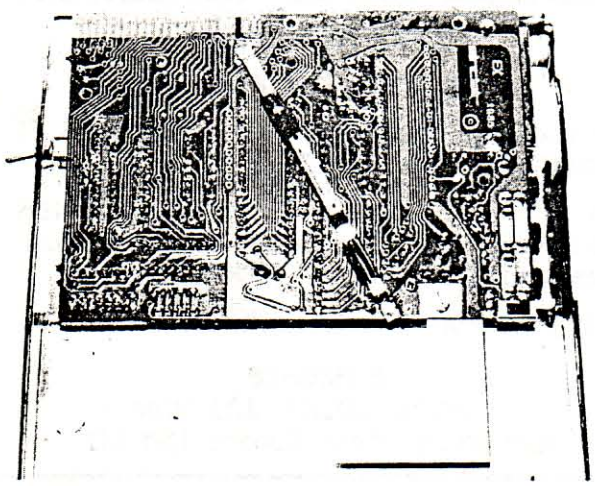
Probably the most aggravating thing that can happen is to have a real long program that you have been writing for the last six hours sitting there on the screen, you reach down, press a button and the computer goes wild, scrolling unknown characters up the screen, flashing and then finally , the terrorizing blank screen. You have gone beyond the realm of the computer's comprehension and into the twilight zone! In other words, the computer lost connection with its memory through a bad contact.

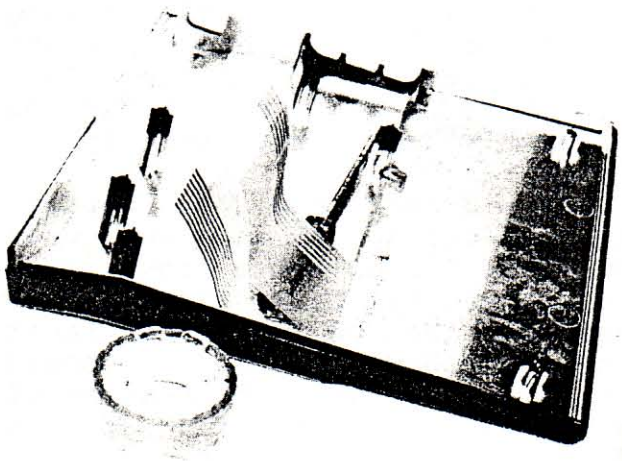
The problem stems from a design flaw. The computer has rubber feet on the bottom while the RAM pack sits directly on the table top. You press a key from the top, the rubber feet give a little, the RAM pack does not and the connector between the two takes up the slack. Connectors, when they slide against each other have never been known to maintain a good connection, especially if there is dust or any other contaminant on the contacts.

There have been dozens of cures for solving this problem, the best that I have found are to clean the rear edge connector, put larger (taller) feet on the computer to raise the RAM pack off the table, and place a piece of velcro or double sided tape between the RAM pack and the rear of the computer.

When cleaning the rear edge connector, make sure the computer is turned off. Use cotton swabs and denatured alcohol, clean both top and bottom and dry off excess alcohol with a dry cotton swab. Also, try not to leave any cotton hairs behind on the connector. It is best not to try and clean the RAM pack connector so as to not damage any of the 'pins'.

If you have lost responce from the computer when you press a key, you more than likely have a cracked ribbon cable. The most common keys to lose are keys 1-5. The laminate that the cable is made of becomes dry and brittle and eventually cracks. To repair this, you must go





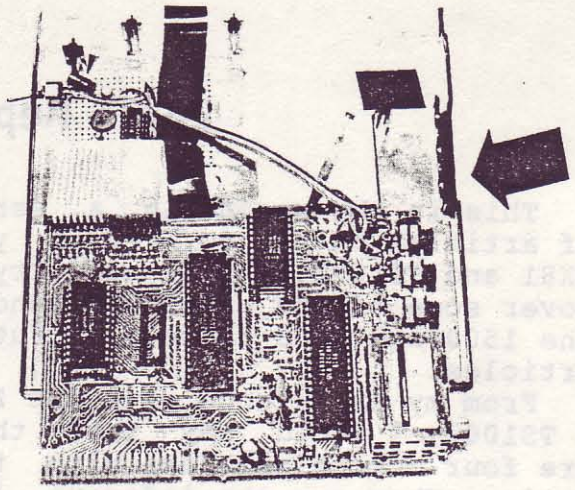
inside the computer and repair the break.

To disassemble the computer, disconnct everything from it, turn it over and remove the three rubber feet that are not near a screw hole. This should reveal five screws. Remove screws and bottom cover. You now should see the bottom (foil) side of the computer. Set the computer so that the power and tape jacks are on the right and unscrew the two small Phillips head screws. Now carefully and slowly lift up the board and rotate it towards you to expose the top side of the board and keyboard cable. The cable is short so the side closest to you will not come up very far, so rotate so that this side acts as the hinge.

Once you can get to the ribbon cables, you will note that there are actually two. Very carefully pull these one at a time out of the connectors on the board. The top should now separate from the circuit board.

The cracks should be very apparent. Generally, the crack is near the now loose end and can be repaired by simply cutting off the bad part with a pair of scissors. If you will have to cut off more than an inch, use copper or nickel print instead. Most electronics stores carry this for repairing cracked circuit boards and it works very well for repairing cracked ribbon cables. It comes in a small jar with an applicator brush in the lid. It's like paint. Simply dab a small amount across the crack in the metal part of the cable taking care not to let it spread and short to an adjacent metal strip. This stuff also works well repairing your rear window defroster strips in your car!

Once you have done the repair, take some cellaphane tape and wrap around the ribbon cable about 1/4" from the end to help aid in re-inserting the cables into their connectors. Now position the board so that you can grasp both sides of the ribbon cable where the tape is and slide back into their respective connectors. Reassemble the computer and check out.



The grounding strap on the foil side of the computer comes loose sometimes at the rear edge connector end and causes problems with interference on the screen and loading. Simply solder it back in place taking care not to let the strap touch any other solder lands.

The 5 volt regulator is mounted on a square flat piece of aluminum, and to the circuit board. This can sometimes overheat and cause the computer to crash after 15-30 minutes of use. If the screw and nut that holds this all together was not tightened well at the factory, tightening it may cure your problem, otherwise, replace it.

Sometimes, the power supply is putting out to much for the regulator to handle and replacing it will help. I have found that the Atari 2600 game replacement power supply works fine as long as you don't have any more than one or two

peripherals connected to the rear. You will know when you have loaded it down two much when thick bands (hum bars) travel up the screen when you turn it on.

The only thing left to go wrong are the integrated circuit chips (ICs). With the computer opened up, you can see four IC's (five in the ZX81). The only two chips that I have seen go bad are the ULA and the RAM IC. If the ULA is bad, it usually gets very hot and no control is seen from the computer. If the RAM IC is bad, generally the cursor won't come up but the screen steadies. If you think that the RAM chip is bad and you have a 16K RAM pack, just remove the 2K RAM IC from the computer and try it with the 16K RAM pack. The computer does not need the 2K RAM chip when using the 16K RAM pack.

There are three different issues of the TS 1000 out there, so the layout may not be the same as that shown in the picture. To tell the chips apart, the ULA says ULA or Ferranti on it. The Z80 microprocessor chip is the other IC the same size as the ULA. The ROM is socketed and the RAM is soldered directly to the board.

To obtain parts for your computer, write to:

Timex Computer Corp.
Little Rock Product Service Center
Little Rock, AR 72203

You can also buy whole computers with minor defects from SYNTAX magazine, RD 2 Box 457, Harvard, MA 01451 (617)456-3661 for $15 each and from Electronics Supermarket, PO Box 988, Lynnfield, MA 01940 (617)532-2373 for $18.88 each. This way you have all the replacement parts you may need.

Remember that you are dealing with sensitive components and make sure the computer is off before pulling the RAM pack or any other peripheral from the rear of the computer. Also, if you don't feel confident about soldering, ask a friend who can do it for you. This would be a difficult first project to tackle.

-- Joe Williamson

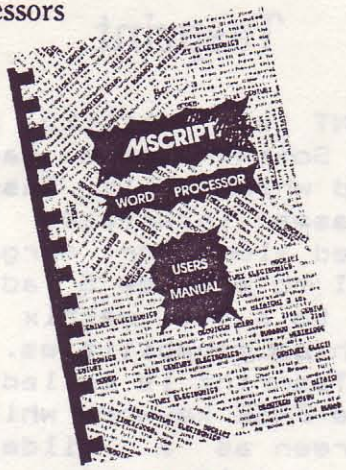
Tasprint

TASPRINT is a utility produced by Tasman Software, the same firm in England which sells Tasword II and the Tasman interface. Tasprint can be used alone or merged with Tasword II to provide 5 additional typefaces to a dot matrix printer with graphics capabilities. In Tasword II, Tasprint is called up by typing the FREE keyword which shows on the screen as a 'tilde'. Tasprint uses two lines for each of its lines of print since its characters are double height. Tasprint is most useful for producing a nice flyer or other document that stands out from the typical computer dot matrix printout.

This typeface is designated as 'Lectura Light' which I like to use in conjunction with bold face ' **Median** '. There is also a superbold face, a computer face called 'Data' and a Script. A word or line may also be printed in **inverse** or with a box .

COMPACTA - bold and heavy, good for emphasis
DATA-RUN - A FUTURISTIC SCRIPT
LECTURA LIGHT - clean and pleasing to read
MEDIAN - a serious business-like script
POLICE SCRIPT - a distinctive flowing font

--Richard Cravy



M-Script

MSCRIPT is the wordprocessor that was supposedly going to be offered by Timex themselves, possibly even on a cartridge. MSCRIPT has been developed not only for the Timex 2068, but also for other computers such as IBM and Radio Shack. As a result, MSCRIPT is not customized as well to the 2068s features and keys as well as Tasword Two and others. The manual is a generic version which is obviously used with every version of MSCRIPT so never mentions the Timex except on the introduction page. MSCRIPT is being distributed by 21st Century Electronics and has much to commend it as well as some problems (don't they all).

Since I began word processing on my 2068 using Tasword Two, I tend to judge all other programs by it. MSCRIPT is, in my opinion, more powerful in most ways than Tasword Two. First, the display is in true 64 column mode as Timex never gave it to us. In constrast, Tasword uses a redefined character set. Howeve., MSCRIPT does not actually turn out with a better display because it cannot be read as clearly on a monitor (it is altogether unreadable on a TV) since it is in inverse. Tasword displays as black characters on a white screen; MSCRIPT does just the opposite and suffers in readability because of it. The option of selecting ink/ paper colors would certainly be a plus.

MSCRIPT allows lines longer than 64 characters, though it will only show 64 on screen at once. Longer lines move the screen "window" to the right as characters past 64 are entered. Tasword is limited to a maximum of 64. At the bottom of the screen is always displayed both which column in your line and which column in the window you are working in. Similarly, which line you are on both on the screen and in your document is shown. Setting or changing line length, indents, margins, etc. can be accomplished by either changing the parameters of the program's print menu, or by simply beginning a line with ">"followed by the appropriate mnemonic command and value. Example: "LL=35,JU=Y,LM=8" tells the printer to begin at that point to print with a left margin of 8, a line length of 35, and with text justified (Y=yes). Whereas Tasword shows on the screen exactly what goes to the printer, with screen lines justified and screen line length always equal to printer line length, MSCRIPT is different. Screen lines are not justified even when justification is on. Screen (or "window") lines can be set to a different length than printer line length. I am sure both systems will have their advocates.

Keyboard scanning is very fast in MSCRIPT, so a key can be pushed then released much more quickly than in Tasword. "Return" when entered by the RETURN key are shown on screen by a left slash to distinguish it from word-wrap produced returns. The DELETE key is operative in MSCRIPT or "function D" can be used. "Function" is produced by holding down on both CAPS SHIFT and SYMBOL SHIFT at the same time while also pushing the appropriate menmonic character such as "D". Most editing commands are accomplished through using the function commands. A separate set of "Command" instructions are available by pressing both CAPS SHIFT and BREAK at the same time. This key combination produces a menu allowing loading, saving,

setting tabs, and adjusting window line length. At the bottom of that menu is also given memory used thus far, memory free, word count, line count, and file name--a very nice set of info not available with Tasword.

All the features usually found on serious word processors are there--block delete, copy and move, search and replace, imbedded printer codes, and such. When editing previously entered text, deletions often leave lines with holes in them and short lines. Tasword allows "reformatting" a paragraph by moving to the beginning of the paragraph and pressing STEP. On MSCRIPT it is much easier; simply move your cursor to any point before the edited area and the paragraph is automatically reformed.

The manual details how to use MSCRIPT and its versatile formatting as a mail list manager and label printer and simple filing program.

Additionally, MSCRIPT will automatically make page breaks and number your pages. This must all be done manually in Tasword Two.

I believe that MSCRIPT comes out very well in comparison to Tasword Two though MSCRIPT is more expensive, currently retailing for $69.95 versus $49.95 for Tasword Two. Its weak points I have mostly named already: harder to read screen, generic documentation, poor utilization of 2068 keyboard. It currently works only with the Aerco printer interface. It comes packaged in a padded cassette holder along with two blank data tapes and its 72 page manual. It is definitely worthy of consideration by anyone doing serious word processing on their 2068. Let's hope 21st Century will provide the modifications--especially better documentation, Tasman interface compatibility and a better ink/paper screen combination--that will put MSCRIPT in a league by itself.

21st Century Electronics, 6813 Polk Street, Guttenberg, NJ 07093. 201/869-2616. $69.95 + 3.50 s/h.

-- Richard Cravy

OmniCalc 2 Spreadsheet
(Spectrum Rom)

Omnicalc 2 is a spreadsheet program that will allow you to have up to 99 columns or 250 rows of data with a maximum of 5000 cells. Unlike VuCalc, it allows the use of all math functions such as NOT, RND, EXPONENTS, <, etc.

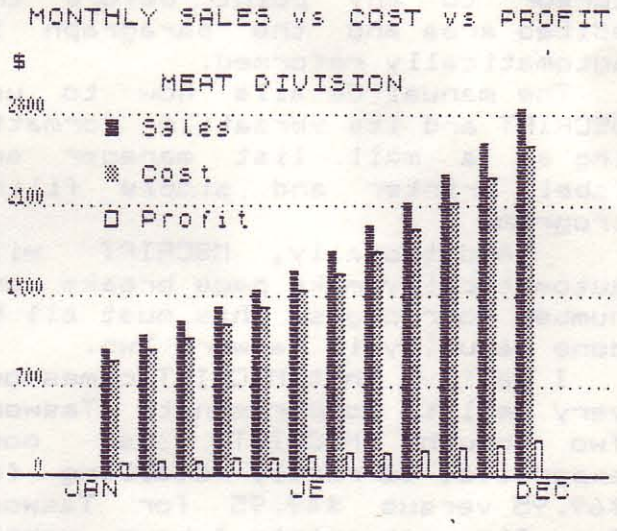
Omnicalc uses a split screen showing two heading rows and one heading column and these appear on the spreadsheet no matter where the window is in the spreadsheet. This feature makes keeping up with the data in the spreadsheet much easier. On the screen, the data window is 15 rows deep and three columns wide with a preset data space of seven digits per cell. All input to the spreadsheet is prompted with sound and screen prompts.

A nice feature of this program is thAt it will make graphs of your data easily. They will be bar graphs that will allow the bars to be stacked one on top of the other. After the graph is plotted, the cursor can be moved around the screen so that the graph can be labeled before printing.

When the spreadsheet is printed out you can print part of it or all of it. The Timex printer prints four columns while an 80 column printer will print ten columns. When you print, none of the column or row location markers are printed out so you produce a nice, clean professional looking table such as the one shown below.

omni calc	SALES	COST	PROFIT
JAN	1000	900	100
FEB	1100	990	110
MAR	1210	1089	121
APR	1331	1197	133
MAY	1464	1317	146
JUN	1610	1449	161
JUL	1771	1594	177
AUG	1948	1753	194
SEP	2143	1929	214
OCT	2357	2122	235
NOV	2593	2334	259
DEC	2853	2567	285
TOTAL	21384	19245	2138

SAMPLE TABLE and GRAPH



There are many fine features in Omnicalc 2 that makes you wonder how they can sell it for $20. To run it on the Timex 2068 you will need to have a Spectrum ROM. I think it is a much better spreadsheet than VuCalc and would recommend it to anyone. I bought mine at SOFTWARE SUPERMARKET, 87 HOWARDS LANE, LONDON SW15 6NU.

-- Roger Hunziker

Word Processing

The Textwriter Series

Of all the word processing software S.U.M. has reviewed, the Textwriter series by Robert Fingerle offers the most versatility for all Timex computer users. Textwriter 1000 is for the 1000 and 1500 series machines and was rated A+ in SYNC magazine's review. (We will not review it further here.) Textwriter 2000 is designed for the 2068 with 2040 printer and 32 column display (TV) and 2000 Plus is for the 2068 with Aerco interface and 32 column display. The newest in the series, Textwriter 2000 + 64 adds a true 64 column screen (monitor recommended).

Perhaps the nicest feature of the Textwriter series, other than the wide variety represented, is the nearly identical set of commands used by each program so that upgrading from one to the next is fairly painless, except for the extra cash outlay. Therefore, we will primarily review the 2000 + 64 version and let you decide which version matches your hardware and will meet your needs.

The manual for 2000 + 64 consists of 12 pages of 8 1/2 x 11 text which clearly carries the user through the process of creating, editing, printing, and saving a document. The use of most of the commands is easy to understand, though I never did fully grasp how to command my dot matrix printer to change typestyles.

When the program first begins, an opening menu in 32 column mode offers you several choices including naming your file, beginning a file, changing your display, saving a file, etc. One of the criticisms I had of M-Script was the unclear display . The +64 display is much clearer, perhaps due to more efficient programming, and your paper/ink colors can be selected the maximize legibility, a big plus in my book.

Text is entered in the TEXT mode but no editing except deletions on the line you are working on is possible without entering EDIT mode. For moving quickly through your text as when proofreading or trying to reach a certain point, the READ mode is accessed. Now back the TYPE mode. When in this mode your text is entered on the screen in 64 column lines regardless of what your printed line length will be. When you reach the bottom of the screen, your text scrolls up 10 lines so you can continue entering. Because most of the program is written in BASIC, keyboard response is not as fast as in M-SCRIPT but is more than satisfactory considering the limitations of the 2068 keyboard. On the other hand, the program is impressively fast for BASIC and indicates good programming technique.

Entering EDIT mode allows a number of operations to take place. A menu of available commands appears across the bottom of the screen. Examples are DL# (delete number of lines specified from cursor down), AL# (add blank number of lines specified so insert can take place), C (closes up holes in text left after editing), and various commands starting with 'B' for block moves, inserts, deletes, etc. Though it sounds complicated, in use it is quite simple. I suspect that for a person who has never used a word processor before, it would be quite adequate. For those, like me, who have used a word processor for a number of years, the overall impression is mixed. The program is easy to use, but many of the commands are line oriented so that entire lines are affected instead of blocks of characters.

The PRINT section is adequate though I have already mentioned that what you see on the screen has no relation to your printout unless you want exactly 64 characters per line just as the display has. Automatic paging of text does occur along with numbering of pages and insertion of a "header" at the

top of each page, none of which are available from TASWORD II. Inserting printer commands in your text apparently is possible (for italicized words, etc.) but I never figured out how to do it. Probably more time with it would have yielded an answer. No more than one line width is possible per document unless tabs are used for those sections of your text which are to be indented. Printouts up to 255 characters wide are possible if your printer can generate them.

All in all I believe TEXTWRITER 2000 + 64 is a good value at $29.95 since it offers reasonable capabilities and 64 columns on screen. Only TASWORD II ($49.95) and M-SCRIPT ($69.95) offer the same screen size. Your best bet? See all three in action before making your purchase. Next to impossible I know, but that's the only safe bet.

TEXTWRITER series is available from Bob Fingerle or a number of other suppliers. The prices are as follows:

TW 1000.....$11.95
TW 2000.....18.95
TW 2000 Plus.....24.95
TW 2000 + 64.....29.95

The above prices are from WMJ Data Systems catalog and include postage. Their address is 4 Butterfly Drive, Hauppauge, NY 11788. To order direct from Bob Fingerle, write to Robert Fingerle, 39639 Embarcadero, Fremont, CA 94538.

-- Richard Cravy

WMJ Data Systems Software

WMJ Data Systems has been kind enough to provide us with several of their software packages for review. At this time, rather than go through each one in detail, I want to make a few comments about each and urge you to request their catalog or see their ads in the September and October issues of SUM.

The 4 packages from WMJ I have actually seen are: *Stock Plot, Check Rec, Household Inventory,* and *Tax Return Organizer.* There are a number of other packages also offered by WMJ, including the Textwriter series by Fingerle. All 4 of the above packages is available both in 1000/1500 and in 2068 versions.

My overall impression of these packages is positive for two reasons. First, each seems to be well written from a programming standpoint. Written in Basic, good graphics and prompts greet you and carry you along. Secondly, the documentation is good, not fancy, but good. Each package is accompanied by several full size sheets of information about its use. Not as convenient as booklets, true, but far better than the miniscule leaflets with Timex software. →

My only two critical comments are both rather subjective, so not everyone will agree. First, I could never get the 1000/1500 Check Rec to load. Two different tapes, three different recorders, and still nothing. However, I have not heard of anyone else having trouble with WMJ tapes. Second, several of the packages do things that could probably been done better with a pen and pad. When I asked William M. Johnson (thus WMJ) about this, he commented, "Our programs are designed for people who love to use their computers in their every day lives, and you can only play so many computer games." Well said.

Check Rec is the first check book program I would be tempted to use myself. It is easy to use and the screen display is admirable. Stock Plot allows you to keep up with your stock prices for a 26 week period including producing graphs on screen and to the printer for each stock as well portfolio profit/loss, dollar value, shares held, etc. Since I own no stock, I can go no further on this one.

Household Inventory uses a spreadsheet format for entering an inventory of your home's furnishings; up to 300 pieces of data (cost, serial #, dates, etc.) can be stored in the 2068 version, less on the 1000/1500. Multiple files could be used if that is not enough room. I liked to screen presentation though scrolling was a slow because of the routines being in Basic. Tax Return Organizer allows you to enter data you will need later in filling out your tax forms but does not actually fill out the forms for you (sorry). Its purpose is to get you to collect most or all of the information you will need ahead of time and keep it in this computer record. It should simplify filling out your return.

The best I've saved for last. WMJ is not out to get rich off the Timex market. That is apparent by the relatively low prices he is charging for his software. Each of the above packages are $10 to $12. A good buy for those who need them.

WMJ Data Systems, 4 Butterfly Drive, Hauppauge, NY 11788.

-- Richard Cravy

Spectrum Buss on 2068

I stated in the last issue that we ordered the Rotronics Wafadrive system from England. I also promised that I would give a report on it. Unfortunately, we have yet to receive it.

Anticipating it's arrival I have prepared a Spectrum buss to plug the unit into. We have already received the operations manual and discovered that it will require a Spectrum ROM based 2068 (the ROM inside the drives begin where the operating system leaves off on the Spectrum which would "write" over part of the 2068's operating system.) It will also require the ROMCS line and +9 volts which do not appear on the 2068. These will have to be generated somehow.

For ROMCS, the 2068 buss has a "not used" finger in the same position as where ROMCS appears on the Spectrum. I went inside my 2068 and connected a small wire between pin 27 of the ROM socket (U16) and the "not used" finger of the rear edge connector (pin 26 on the bottom side). It should be obvious which one it is because no solder lands lead away from this finger.

After this is done, that gives us 29 positions the same as the rear card-edge connector on the Spectrum. For the rest of the connections, I made up an extender card using a 28 position wire wrap edge connector and an extender card cut to size (28 positions and one inch long) (Vector part number 3690) both available at Skipper Electronics. I keyed the edge connector and slotted the card in the 5th position as on the Spectrum and then proceeded to solder all the pins that were the same on both machines (see figures) to it's corresponding position on the edge card. The remaining pins were cut

back some so they wouldn't short against anything.

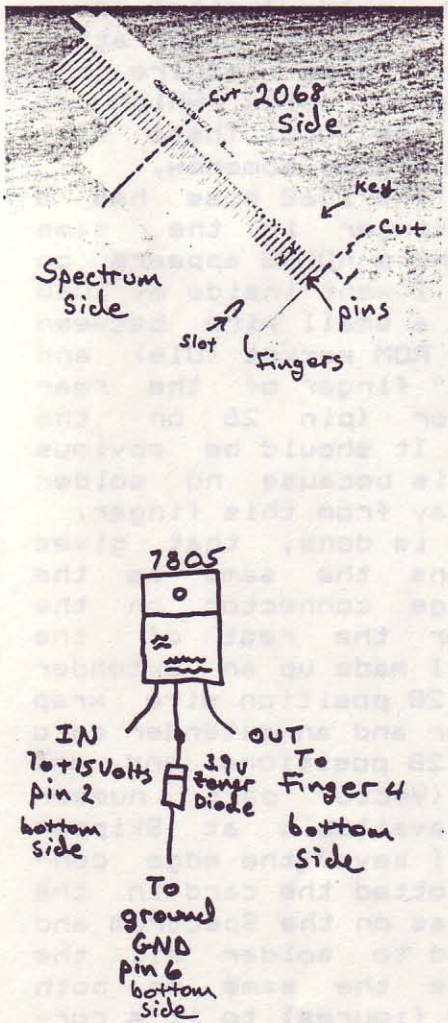
To generate the +9 volts, I used a five volt regulator (#7805) and a 3.9 volt zener diode in series with the ground lead (diode cathode to ground lead) which references the 7805 voltage regulator at 3.9 volts thus giving a total regulated output of 5+3.9=8.9 volts which is close enough. Tie the input leg of the regulator to +15v (pin 2 bottom side of the 2068.) Tie the output lead to finger 4 on the bottom side of the extender card and the anode lead of the zener diode to pin/finger 6 (ground) See figure.

Using as short as possible lengths of wire, connect signals from the 2068 buss to their respective positions on the Spectrum buss (see figure). The positions are numbered differently between the 2068 and the Spectrum, but everything is relative to the slot, so keep counting from there.

To save time and trouble, I only connected A8-A15, BUSRQ, RESET, and BUSAK. The -5 volts, +12 volts, and the -12 volts will probably be required for the RS232 part of the Rotronics, but we will worry about that later when we receive the drives.

Next Month: A printer interface you can build for the 2068!

-- Joe Williamson



5 volt regulator and diode wiring

TS 2068 BUSS			ZX SPECTRUM BUSS		
Top		Bottom	Top		Bottom
GND	1	GND			
EAR	2	SPKR/TAPE OUT	A15	1	A14
A7RB	3	+15 VOLTS	A13	2	A12
D7	4	+5 VOLTS	D7	3	+5 VOLTS
DZIN	5	NOT USED <<	NOT USED	4	+9 VOLTS
---SLOT--	6	-SLOT----------	----SLOT---	5	-SLOT-----
D0	7	GND	D0	6	GND
D1	8	GND	D1	7	GND
D2	9	CLOCK	D2	8	CLOCK
D6	10	A0	D6	9	A0
D5	11	A1	D5	10	A1
D3	12	A2	D3	11	A2
D4	13	A3	D4	12	A3
$\overline{INT}$	14	A15B	$\overline{INT}$	13	IORQGE
$\overline{NMI}$	15	A14B	$\overline{MNI}$	14	GND
$\overline{HALT}$	16	A13B	$\overline{HALT}$	15	VIDEO
$\overline{MREQB}$	17	A12	$\overline{MREQ}$	16	Y
$\overline{IORQB}$	18	A11	$\overline{IORQ}$	17	V
$\overline{RDB}$	19	A10	$\overline{RD}$	18	U
$\overline{WRB}$	20	A9	$\overline{WR}$	19	$\overline{BUSRQ}$
$\overline{BUSACK}$	21	A8	-5 VOLTS	20	$\overline{RESET}$
$\overline{WAIT}$	22	A7	$\overline{WAIT}$	21	A7
$\overline{BUSRQ}$	23	A6	+12 VOLTS	22	A6
$\overline{RESET}$	24	A5	-12 VOLTS	23	A5
$\overline{MI}$	25	A4	$\overline{MI}$	24	A4
$\overline{RFSHB}$	26	NOT USED <<	$\overline{RFSH}$	25	$\overline{ROMCS}$
$\overline{EXROM}$	27	R	A8	26	$\overline{BUSACK}$
$\overline{ROSCS}$	28	G	A10	27	A9
$\overline{BE}$	29	B	NOT USED	28	A11
IOA5	30	BUS ISO			
SOUND	31	VIDEO			
GND	32	GND			

Ram Pack Repairs

In this article, I will discuss some of the problems that can occur with the 16K RAM pack for the ZX81, TS 1000, and TS 1500.

As I said in my last article, RAM pack 'wobble' is the most common problem and can be cured by cleaning the connector, raising the RAM pack off the table, and using Velcro/double-sided tape to secure it to the rear of the computer.

This month we will go inside the RAM pack and see what we can do to solve some of its problems.

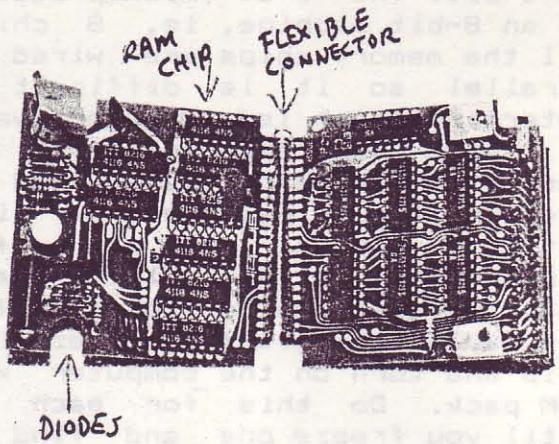
If you have crashes every time you power up your computer with the RAM pack attached, and it works fine without, and you have tried the above cures, then possibly you have a faulty RAM pack. Generally, the screen will try to initialize but can't and might scroll wild characters up the screen.

A different sequence is the computer initializing properly and seems to work OK, but strange characters appear on the screen in random places and in text you write on the screen. This means that you have a bad memory chip. Bad news!

First things first. Before you open your RAM pack, check and make sure the 'key' is still in the third slot from the left. If not, replace it with a small piece of plastic cut to size (I found that the plastic AC receptacle plugs for guarding against children's fingers happen to be the right thickness and width - just cut to length).

To open the RAM pack, remove the four screws, two in the front and two in the rear. Carefully remove the back cover and then work the connector through the opening in the front to separate the circuit board from the front cover.

Once apart, carefully spread the two boards apart. Watch the flexible connector as it can break off from either end quite easily. This is the first thing to check as I have opened several to find this



was the only problem. The easiest way to repair this is to add another wire to replace the broken one and be sure to cut the broken one back so that the frayed ends won't short against anything.

Electrically, the power supply is the first thing to check. The RAM pack has its own switching power supply and derives +12 volts and -5 volts from the +9 volt computer supply. To check for proper voltages, plug the RAM pack in (cover still off) and turn on the computer and measure the voltage on pins 1, 8, 9, and 16 on the 4116 RAM IC chips with respect to ground. Ground can be found on pins 4 & 5 on the edge connector underside. Pin 1 on the 4116 RAM IC chip should read -5 volts, pin 8 should read about +12 volts, pin 9 should read +5 volts and pin 16 should read 0 volts.

If these voltages are off, check the diodes and the transistor. The transistor can be replaced by a 2N3906. I have seen the 5.1 volt zener diode short out in several packs, so if you don't have -5 volts, this most likely is your problem (look at the schematic included in this issue).

There were three issues of the RAM pack with each one laid out differently as far as components are concerned, otherwise they basically work the same. The RAM IC chips are on the board farthest away from the edge connector. There will be 8 of them all marked with the number 4116. Each chip is 16K

by 1 bit. The Z-80 microprocessor is an 8-bit machine, ie, 8 chips. All the memory chips are wired in parallel so it is difficult to determine which is/are defective.

I have found that sometimes you can determine which one is bad by freezing the chips, one at a time, until it works. You can find 'freeze mist' at your local Radio Shack or electronics store. To find the faulty chip, simply freeze one chip and turn on the computer with RAM pack. Do this for each one until you freeze one and find it works. It will probably only work for only a few seconds if you do it this way.

Though freezing the chips sometime works, you may find that you wasted a $3 can of freeze mist. If you do find a chip that you think is bad, replacing it is another story. You need a very fine soldering iron and some method of solder removal--I would suggest the vacuum method. These boards have very thin solder lands and were not designed to be repaired.

The other chips on the boards rarely go out so I would not worry about them. Your best bet is to buy several RAM packs as back ups. I have seen them for as little as $10 uncased. Syntax is selling them for $15 (see address last issue).

As a final note, when removing the screws from any of the computers, be sure to remember where they came from. The screws are not all the same size and could strip out their plastic counterparts when replaced in the wrong position. Also, don't over torque the screws.

Next month I will talk about adding and changing the rear edge connector on the 2068 to run Spectrum hardware (like microdrives).

--Joe Williamson

TS 2068 Printer Interface

This month I will discuss building a printer interface for the 2068. With all the software out on the market for the 2068, its hard to figure out what's the best route to take in deciding which printer interface to buy for the best variety of good programs. The interface described here will work with almost all of them - either Spectrum or 2068 type.

Once again, this is a fairly advanced project and should be attempted by only those who have had lots of experience soldering and working with digital circuits.

The two most popular interfaces are the Aerco printer interface from here in the states and the Tasman interface from England. Tasman has two types of interfaces out on the market named type 'A' and type 'B'. The type 'B' is the one that is sold now, but there is still alot of the type 'A' software out there.

Each type is decoded to a specific I/O port (0-255) of the computer for both sending data to the printer and receiving the status of the printer (whether its busy or not). The different ports are as follows:

	port	
type:	IN	OUT
Aerco	127	127
Tasman 'A'	63	123
Tasman 'B'	191	123

To design a printer interface that will emulate any of these other available interfaces, you need to be able to decode all of these I/O ports.

Address lines A0-A7 are used to select any one of the 256 possible I/O ports. Eight address lines, 2↑8=256. To select port 127, all address lines would be logic 1 with the exception of A7 being logic 0.

The address lines are weighted as follows:

```
128  64  32  16  8   4   2   1
A7   A6  A5  A4  A3  A2  A1  A0
```

64 + 32 + 16 + 8 + 4 + 2 + 1 = 127

Hence, port 127 is selected when A0-A6 are logic 1 or true. For the rest of the ports in the table above, you can see that the only address lines that change are A2, A6, and A7 while A0, A1, A3, A4, and A5 all don't change. With just A2, A6, and A7 changing, the following table can be derived:

A0-A1, A3-A5 are logic 1

	logic A2	A6	A7	port	
0	0	0	0	59	
1	0	0	1	187	
2	0	1	0	123	<
3	0	1	1	251	
4	1	0	0	63	<
5	1	0	1	191	<
6	1	1	0	127	<
7	1	1	1	255	

Try adding up the weight of each address and see if you come up with the ports listed above.

Hardware wise, the above table can be implemented by using a 74LS 138 - a 3 to 8 line decoder. This chip also has several enables on it which makes it handy for taking care of other control lines.

The other addresses are 'NANDed' together using a 74LS20 4-input NAND gate and tied to one of the enables of the decoder along with IOFQ and A5. The outputs are 'NORed' using a 7411 3-input NAND gate and then are 'ANDed' with their respective WR and RD lines using a 74LS02 NOR gate. These two outputs go into a S-R flip-flop using left over gates which strobes the printer.

The chip count is only six in this project and will allow you to drive a parallel printer using any software that contains the printer driver built in such as TASWORD II, MSCRIPT, MASTERFILE, TEXTWRITER+ 64 and others for either the Aerco or Tasman interfaces.

Next month I will talk about the signals the printer requires and give a circuit board layout.

Joe Williamson

Beginner's Basic Programming

This is a beginner's program that will display some of the useful capabilities of the Timex-Sinclair computers and will run on the ZX 80 (8K), ZX 81, TS 1000 (all with 16K RAM attached), TS 1500, and the TS 2068. For convenience, lets call these the 1000 and the 2068. The convention is to number in increments of 10. Do not be afraid to experiment! alot can be learned about the art of programming from experimenting.

SAVEing is the most important consideration for a beginning programmer. Read the User Manual chapter on SAVEing. Type 9991 SAVE "smily face" ENTER. Do you know why the 'e' was left out of "smily face"? Insert the 'e' and type GOTO 9991 ENTER. See why? DELETE the 'e'. Type GOTO 9991 ENTER. -Note, I will type all key-words in CAPITALS so they can be entered with one keystroke from the keyboard.

To make the program auto-run upon loading, type 9995 GOTO 1 on the 1000. On the 2068, type 9991 SAVE "smily face" LINE 1 ENTER (LINE 1 auto-runs on the 2068). For the 2068, type 9992 INPUT "Verify? y/n ";n$ ENTER, 9993 IF n$="n" THEN STOP ENTER, 9994 VERIFY "" ENTER. After SAVEing you will be asked: Verify? y/n. Typing 'n' will stop the program. Any other key (except BREAK or spacebar) will verify your program. SAVE the program to tape for future use.

Lets develope a simple, straight forward arithmetic program, such as x + y = z. X is the augend, y is the addend and z is the sum. x and y enter the problem into the computer. Z enters the answer of the student.

LOAD your SAVE routine from tape and type 3310 INPUT x ENTER, 3320 INPUT y ENTER, GOTO 1 ENTER. Answer the INPUTs. Surprised? Hold down both the CAPS SHIFT and BREAK keys until the program BREAKs. A barrier is needed between the program and the save routine. Type 9990 STOP ENTER, GOTO 1 ENTER.

To present the problem to the student, type 3350 PRINT AT 6,0 ;x;" + ";y;" = ?" Enter. 3360 INPUT z ENTER. Type 3380 PRINT AT 6,0;x;" + ";y;" = ";z ENTER. -Note: the computer does just what you tell it to so the answer may be wrong! Run the program and input 7 for x, 8 for y, and 13 for z. When 7 + 8 = 13 is presented on the screen, type PRINT x+y ENTER. The correct answer will be printed on the next line. To make the program repeat, type 3490 goto 3300 ENTER.

We now have a usable progam. If you wish a complete math program, EDIT each line and make the following changes in lines 3310-3490. Add 200 to each line number and change the '+' to a '-'. Then take this set of program lines, add 200 to each line number and change the '-' to a '*'. Then take this set and add 200 to each line number and change the '*' to a '/' so that you have a program that looks like the one below. SAVE the program by typing in GOTO 9991 ENTER. Study ways to make this program more user friendly.

Next month we will add a menu, make the insertion of x and y automatic, number the problems, and continue general improvements making the program more useful. In the meantime, EXPERIMENT!

Bill Woodward

```
3310 INPUT x
3320 INPUT y
3350 PRINT AT 6,0;x;" + ";y;"
= ?"
3360 INPUT z
```

```
  3380 PRINT AT 6,0;x;" + ";y;"
= ?"
  3490 GO TO 3300
  3510 INPUT x
  3520 INPUT y
  3550 PRINT AT 6,0;x;" - ";y;"
= ?"
  3560 INPUT z
  3580 PRINT AT 6,0;x;" - ";y;"
= ?"
  3690 GO TO 3500
  3710 INPUT x
  3720 INPUT y
  3750 PRINT AT 6,0;x;" * ";y;"
= ?"
  3760 INPUT z
  3780 PRINT AT 6,0;x;" * ";y;"
= ?"
  3890 GO TO 3700
  3910 INPUT x
  3920 INPUT y
  3950 PRINT AT 6,0;x;" / ";y;"
= ?"
  3960 INPUT z
  3980 PRINT AT 6,0;x;" / ";y;"
= ?"
  4090 GO TO 3900
  9990 STOP
  9991 SAVE "smily face" LINE 1
  9992 INPUT "verify? y/n ";n$
  9993 IF n$="n" THEN STOP
  9994 VERIFY ""
```

*Run a separate wire (not included) connected to the +5 volts location shown in the instructions for the RGB Conversion Kit.

Try out the new system by entering BORDER 6. If the edges of the display have wiggles or the screen goes blank, open the computer and adjust the Horizontal by turning the "VRI" located in the bottom left side and/or the "C5" which is at the middle upper right part of the board.

I now have fantastic sharpness and color. I noticed Sears had this monitor on sale recently for $319.00. (Editor's Note: *Consumer Report's* January 1985 issue rated this monitor's 80 column display in RGB mode as good as those monitors costing twice as much!)

-- Phil McConaghey

An RGB Monitor for the TS 2068

I purchased a Model No. 4084 TV/monitor from Sears ($364.00 including tax) together with RGB Cable Model 6539 ($18.00). I had to modify my computer using an RGB Conversion kit #220-453 from Arthur Brown Co., 1702 Oak Knoll Drive, Alexandia MN 56308 ($19.95). This kit requires opening the computer and doing some soldering inside. I connected the cable as follows:

Conversion Cable	RGB Sears Cable
Brown	Orange
Red	Red
Orange	Brown
Green & Yellow	Bare Wire
White	Green
Black	Blue
*+5 volts	Yellow

TS 2068 Printer Interface

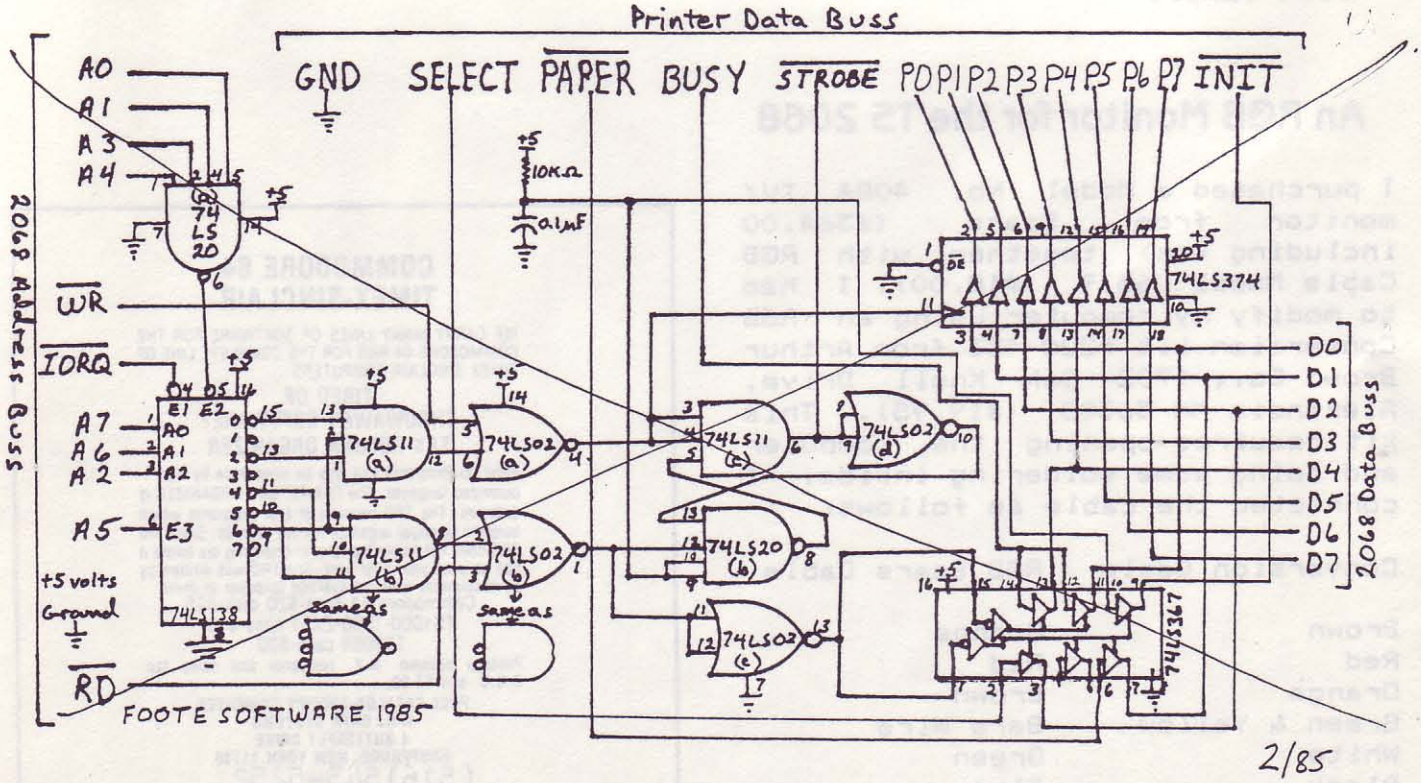
Last month when I started my article for the printer interface, I came up with the idea of using the cartridge port. I had designed the printer interface using the rear edge connector on my 'proto-board' and everything worked great on that. As I was writing the article, I changed heading and actually altered the schematic without implementing the changes using the cartridge port.

Since then, I have built a proto-type and actually do use it (In fact, for this article). I cut an edge-card board down to size and mounted the components and had room to spare. The wire from the interface comes out where the door meets the bottom edge and bends around and out from underneath the computer. The cartridge door closes perfectly and there is plenty for room for the ribbon cable to exit unerneath the computer.

Using the cartridge port seemed a logical idea with all the other peripherals I had hanging off the rear edge connector. little room was left for anything else. I started laying out the printed circuit board and realized (again) that another improvement was in order.

Why not add an EPROM holder to the board and have a combination printer interface/EPROM board? So I scrapped the layout I had almost finished and started laying out one that would hold the EPROM board schematic shown in the 2068 technical manual. This required a little more time and work and as of this writing, I'm not quite finished so I'll have to wait till next issue to print my masterpiece.

Fortunately, all the signals needed were available from the cartridge port with the exception of RESET which is not absolutely needed but could be emulated using a 'poor man's reset' which is a resistor - capacitor combination which will



Schematic for 2068 Printer Interface

bring the common line between the two to a low (logic 0), simulating RESET.

You will notice that last month, I connected the 'poor man's reset' directly to the INIT of the printer and to the R-S flip flop combination (74LS11(C), 74LS20(B), and 74LS02(D)). This allows the printer to reset the interface, but when you turn on the computer, it's possible to fill the printer's buffer with nonsense characters because the INIT line floats high to logic 1 and won't allow the computer to bring it low when it powers up.

This is really no big deal and can be cleared by simply sending something to be printed to the printer.

Hardware wise, there is a simple solution. Instead of going directly to the INIT line of the printer, go through one of the unused buffers of the 74LS367 - namely in on pin 10 and out to INIT from pin 9. This will isolate the INIT from the RESET until the computer is turned on which in turn turns on the buffer and resets the printer while RESET is still low.

Please note the correction in this month's issue. Also, the missing pin numbers for the 74LS02(d) have been included.

I finished last month telling how the decoding of the ports work which allows emulating both the Aerco and Tasman interfaces. This finishes the operation with how the data is read from and written to the printer.

The first thing that must be done before data is sent to the printer is to check the status of the printer. The printer must be ready to accept data before any can be sent, otherwise, that data will be lost and only garbage will print.

SELECT tells whether the printer is on line or not and PAPER tells you when the paper has run out on your printer. INIT clears the printer's buffer and resets it. BUSY tells you when the printer is ready to accept new data and STROBE is a signal to the printer telling it to load data into the buffer for printing. These 'handshaking' lines keep everything in order so the proper operation happens at the proper time.

When the interface is powered up, it resets the flip flop into the

read state. The printer line that must be checked is the BUSY line. Programs written for the Tasman interfaces check bit 0, those written for the Aerco interface check bit 4. Notice on the schematic that the BUSY line goes through the 74LS367 buffer to both bit 0 and bit 4.

Once the program has determined that it can send data, an out command is done to the printer I/F port placing the printer data on the data buss lines of the computer. This out command 'clocks' the 74LS374 and 'latches' (stores) the data onto the printer data lines. This also toggles the flip flop and 'strobes' the printer, filling the printer's buffer with data to be printed.

This process takes place each time a character is sent to the printer. When nothing is happening, the 74LS367 and 74LS374 are in their 'tri-state' which isolates the computer's data buss so that it can perform other operations.

The EPROM part of the interface is basically the same as that shown in the 2068 technical manual in figure 5.1-1. This is the same configuration as what Doug Dewey uses for his EMU-1 Spectrum Emulator, and what Ray Kingsley and John Oliger use for their EPROM cartridge boards.

I used a 'solder transition connector' (like what Aerco uses) to permanently terminate the ribbon cable to the p. c. board and a standard crimp-on Centronics style ribbon connector on the other end. I have had no problem using this on my Panasonic printer, a Riteman, and the Star (Gemini 10x) printers.

Next month, I will talk about print routines to drive the printer interface and I promise to have the printed circuit board layout.

Joe Williamson

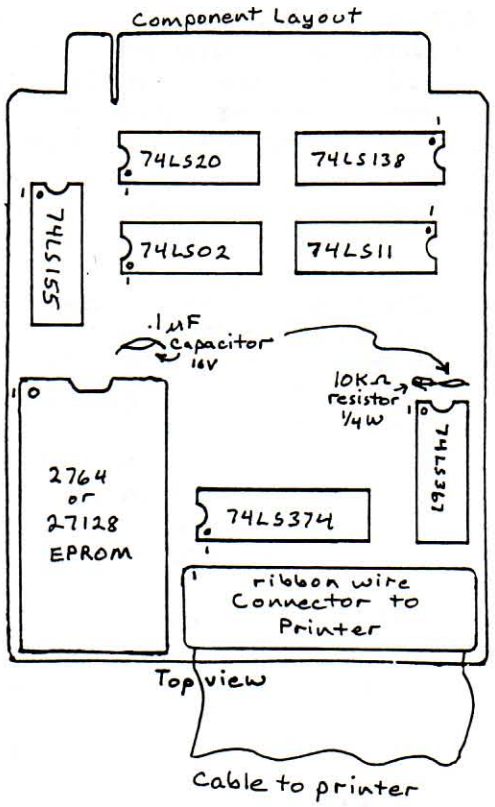
2068 Printer Interface and Rom Card

This month I finish up my series on the printer interface with the circuit board layout and simple print driver software.

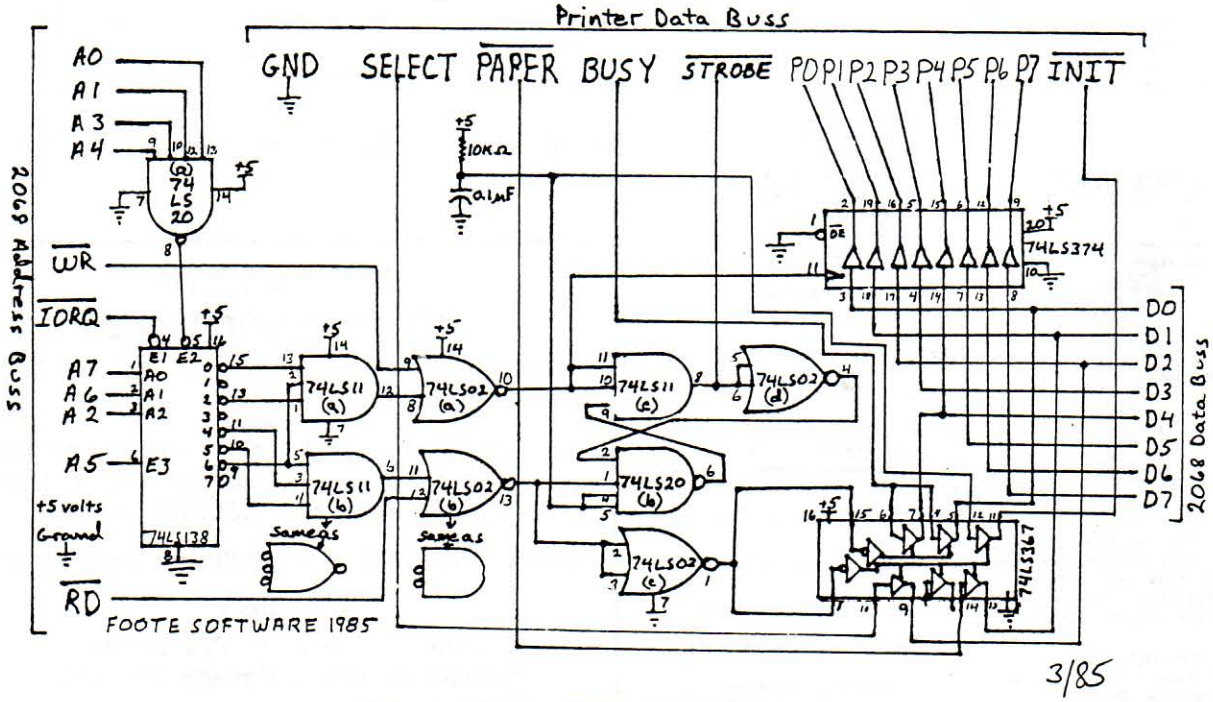
In reconfiguring the layout to include the ROM interface, I had to rearrange things a bit, so here is the final version of the schematic showing the new pin configuration. The schematic to the ROM interface is identical to what is shown in the 2068 technical manual.

This takes a double-sided board which is very difficult to align properly, so take great care in transferring the layout to copper. It would be advisable to send it off and have it done professionally which is what I am having done.

I used a standard centronics connector with 26 conductor ribbon cable to match up to the 26 pin solder transition connector on the interface board. Note that this only takes care of pins 1-13 and pins 19-31 on the printer connector. This is where all the necessary signals for proper operation are (see diagram). Also note that all the signal pins (except INIT) are on the top side



Component layout on circuit board (shown actual size)



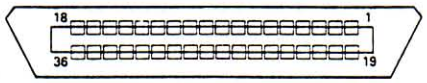
Schematic for 2068 Printer Interface

of the connector and that all the lower pins (19-30) are ground. This makes every other wire in the ribbon cable a ground which isolates all the data signals. That is why every other pin on the interface connector is a ground. When you make up the cable, make sure that pin 1 of the printer connector goes to pin 1 of the interface connector.

The signals shown and used are for my Panasonic KX-P1091. Your printer may be slightly different. The only signals absolutely required are STROBE, DATA 1-8, and BUSY. The other pins are just luxury (my schematic lists DATA 1-8 as P0-7). In fact, All software that I have seen written for Timex and Sinclair use these signals.

To use the interface, plug the interface in, turn on the computer and load any program for use with Tasman or Aerco printer interfaces (with print driver software built in such as Tasword, Mscript, Textwritter, etc.) and enjoy! No more worries about POKEing this and that.

Use a connector, AMP CHAMP 36 BAIL LOCK TYPE, to input data into the Printer. Pin configuration and its signals of the receptacle in left rear of the Printer are described below. Pins 18 and 36 are not linked.



PIN	SIGNAL	PIN	SIGNAL
1	$\overline{\text{STROBE}}$	19	TPG (PAIR WITH 1 PIN)
2	DATA 1	20	TPG (PAIR WITH 2 PIN)
3	DATA 2	21	TPG (PAIR WITH 3 PIN)
4	DATA 3	22	TPG (PAIR WITH 4 PIN)
5	DATA 4	23	TPG (PAIR WITH 5 PIN)
6	DATA 5	24	TPG (PAIR WITH 6 PIN)
7	DATA 6	25	TPG (PAIR WITH 7 PIN)
8	DATA 7	26	TPG (PAIR WITH 8 PIN)
9	DATA 8	27	TPG (PAIR WITH 9 PIN)
10	$\overline{\text{ACK}}$	28	TPG (PAIR WITH 10 PIN)
11	BUSY	29	TPG (PAIR WITH 11 PIN)
12	PAPER	30	GND
13	SELECT	31	$\overline{\text{INITIAL}}$ (PAIR WITH 14 PIN)
14	GND	32	ERROR (PAIR WITH 15 PIN)
15	GND	33	GND
16	GND	34	$\overline{\text{CLK}}$ (PAIR WITH 33 PIN)
17	CHASSIS GND	35	$\overline{\text{TEST}}$ (PAIR WITH 16 PIN)
18	+5V 80mA Max.	36	+5V

Pins used on parallel 36 pin connector (1-13 & 19-31 pins only)

To use the interface with your own programs, the following program will take whatever is placed in a$ and print it. You can format a$ to print out in any mode you choose by checking with your printer manual and placing the proper codes in a$ around your text. Use it as a sub-routine in your own program.

```
9000 REM a$ contains material to
be printed
```

```
9010 FOR n=1 TO LEN a$
9020 IF IN 127<>236 THEN  GO TO
9020
9030 OUT 123,CODE a$(n)
9040 NEXT n
9050 OUT 123,10
9060 RETURN
```

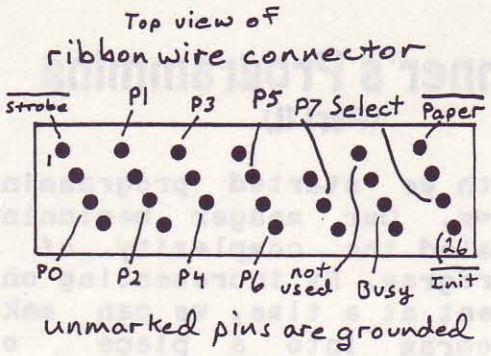
Line 9010 checks for the length of the string to be printed and sets this as the number of loops the program makes. Line 9020 checks to see if the printer is ready for data to be sent. My printer reports with 236 when its ready to receive data, yours may be different. To check yours, simply turn on the entire system and enter: PRINT IN 127 or 63 or 191, and this will give you the ready data. Use that if its different from mine. Once the printer is ready for data, line 9030 outputs to the printer the current 'slice' of a$. It then goes back and gets the next character and continues till all of a$ has been sent. Line 9050 then tells the printer that its finished sending and to do one linefeed.

If you like to experiment, try removing line 9020 and see how far you can print till things get jumbled. I can usually print at least a whole line. Without line 9020, its like shooting in the dark continuously, hoping that maybe you will hit the target at least once!

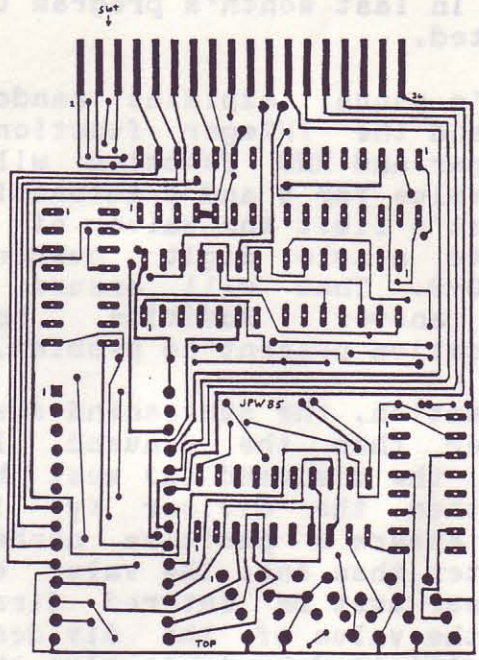
The EPROM part of the interface gives you the ability of using the printer interface with a spectrum emulator. Doug Dewey's EPROM from his EMU-1 will work as well as other EPROMs such as those from Ray Kingsley and others which are slowly making their way to the marketplace.

FOOTE SOFTWARE intends to offer this interface as the FOOTE PRINT and will include MC software for LPRINT and LLIST and possibly COPY. Write to them for details (see ad this issue). Price is expected to be less than $50.

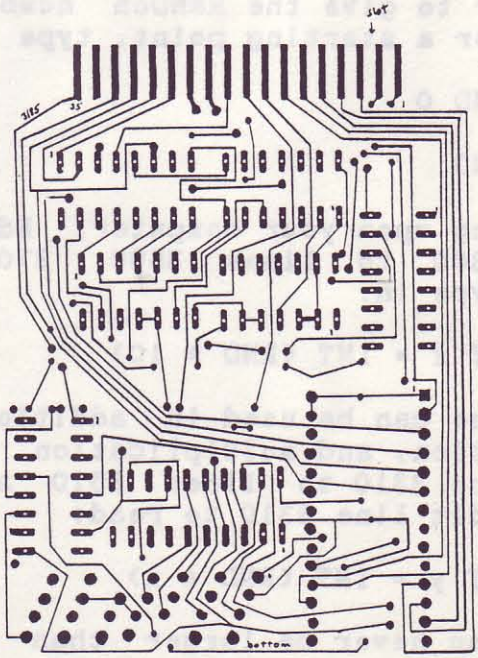
-- Joe Williamson



Enlarged view of wire ribbon connections on board



Front and back of circuit board (actual size)



Beginner's Programming
(Part II)

Last month we started programming with x+y=z. Our meager beginning has revealed the complexity of a simple program. By incrementing one improvement at a time, we can make this program into a piece of professinoal work. Let's first make the computer write the problems for us. Load in last month's program to get started.

The user's manual explains random numbers and the INTeger function. The INTeger and RND function will enter a value for x and y automatically. Let's limit the value of x and y to single digit numbers between 0-9. That will ensure a positive answer. Addition and multiplication present no problem.

In subtraction, the subtrahend must be smaller than the minuend. In division, the dividend (x) must be larger than the divisor (y) in order to ensure a positive number and greater than one. The value of the divisor must be entered first so that the value of the dividend can be multiplied by it to give the dividend the proper value.

In order to give the RANDom number generator a starting point, type in

```
3300 RAND 0
    or
3300 RAND
```

depending upon your computer. Edit line 3300 to lines 3500, 3700, 3900. Type in:

```
3310 LET x = INT (RND * 10)
```

This line can be used in addition, subtraction, and multiplication so edit line 3310 to lines 3510 and 3710. Edit line 3310 to read:

```
3320 LET y = INT (RND * x)
```

Now y can never be larger than x. In division, you cannot divide by 0, therefore the divisor must never be 0. Type:

```
3910 LET y = INT (RND * 9)+1
```

The divisor will never be more than one digit or equal to 0. To keep the answer whole, multiply the random number by the divisor. type:

```
3920 LET x= INT (RND*10)*y
```

Delete 3390, 3590, 3790, and 3990.

Consider now providing feed back for a wrong answer. If x + y does not equal z, how can the computer tell the student? One simple straight forward solution is to present the problem to the computer to solve. Type:

```
3410 IF z<>x+y THEN GO TO 3350
```

Edit this line to 3610, 3810, and 4010 changing the + to - to * and to / as appropriate.

In lines 3380, 3580, 3780, and 3980, change the "= ?" to "= ";z

To select the option we desire calls for a menu. Type in:

```
3070 PRINT AT 6,0;"IF YOU WISH T
O DO SOME PRACTICE"
3072 PRINT AT 8,3;"IN ADDITION__
______TYPE 1"
3074 PRINT AT 10,3;"IN SUBTRACTI
ON_____TYPE 2"
3076 PRINT AT 12,3;"IN MULTIPLIC
ATION__TYPE 3"
3078 PRINT AT 14,3;"IN DIVISION_
_______TYPE 4"
3079 PRINT AT 16,3;"TO EXIT_____
_______TYPE 5"
3080 PAUSE 0 (OR 4E4)
```

Now to read INKEY$ functions:

```
3090 CLS
3100 LET A$=INKEY$
3110 IF A$="1" THEN GO TO 3310
3120 IF A$="2" THEN GO TO 3510
3130 IF A$="3" THEN GO TO 3710
3140 IF A$="4" THEN GO TO 3910
3150 IF A$="5" THEN STOP
3160 IF A$<>"1" OR A$<>"2" OR A$
<>"3" OR A$<>"4" OR A$<>"5" THEN
 GOTO 3070
```

Statement 3160 will only permit use of numbers between 1 and 5.

I have deliberately steered clear of using CLS (clear screen) very much for now. The CLS is a very handy command in programming. when ever you need a clean slate to write or draw on, enter a CLS command in the program. Experiment a little.

Next month, we will number our problems, limit our loop to ten problems, give the number out of ten correct, personalize our program and start our logo, smiley face.

Bill Woodward

Tasword II Improvements

This program will allow you to change the screen and ink colors in the Tasword II word processor from BASIC to your own choosing.

Up till now, if you go into basic and change the BORDER, INK, and PAPER to your own colors, as soon as you return to Tasword, only the paper and ink stay how you set them while the border and bottom menu revert back to the original black on white.

To make the changes, load Tasword and go into basic by using STOP, press b then ENTER. Enter the following lines:

```
9000 POKE 58488,201
9010 POKE 58598,201
9020 POKE 59987,201
9030 POKE 64568,64: POKE 64569,0
: POKE 64570,0
9040 POKE 64840,58: POKE 64841,1
91: POKE 64842,90: POKE 64844,19
2: POKE 64845,90
```

Once these are entered, go back and carefully check that all the numbers are correct and then enter GO TO 9000. Now enter DELETE 9000, which will remove these lines (don't forget the comma). Return to Tasword by pressing RUN ENTER and go back to the menu by pressing STOP and select the save Tasword option to save these new changes.

To change screen colors, simply select the into BASIC option and type in your choice of BORDER, INK, and PAPER colors.

Instead of going into basic, you could incorperate extra lines into the menu and have it ask you for your selection or if there is a combination you want to stick with, enter them into say, line 5 such as:

```
  5 INK (color): PAPER (color):
BORDER (color): CLS
```

Now Edit line 15 to say GO TO VAL "5" instead of GO TO VAL "10". Save any changes you make. Enjoy your enhanced version of Tasword!

Peter Orvis

Tax Time...and Some Help

Here it is just one month before income tax filing time and, if you are like me, you could use a little (or a lot) of help preparing your tax forms. For those with TS 2068s there is help available in the form of SPECTAX85 from Poretsky and Poretsky, 521 Argyle Rd., Brooklyn, NY 11218.

Retailing for $16.95 ppd., this program will not put a dent in your refund check, but will help you fill out your 1040 and accessory forms quickly and easily. Spectax leads prospective filers through Form 1040 as well as Schedules A, B, C, D, E, G, R, W, SE and Form 2441.

When the program is first loaded you are asked if you want regular or heavy print. Selecting "heavy" causes an alternate character set to be used producing heavier characters both on the screen and on the 2040 printer. To go through the program, you need to have already gotten your papers in order and have copies of all your IRS forms with you as the program asks you for data which may require clarification from the respective tax form. Spectax asks you for entry of the proper data in the sequence required by the tax forms, and automatically does the calculations which you would normally have to do manually.

At the completion of each form, a complete one screen reproduction of all info recorded on that form is provided so that you may review it, go back and correct it, and print it out. This last action is important since data entered on all forms except 1040 and A and B is not saved in memory, only the info that is transferred back to the 1040 is retained. Your printout will be your only record of the specific data you entered on each of the other forms. This printout is necessary for filling out your real forms afterward.

There is 2K of memory reserved at the top of ram for adding the software necessary to drive the Aerco or Tasman interface. This must be done by the user, as no documentation is provided explaining in detail that this can be done or how. In fact, except for one small sheet included with the cassette, there is no documentation at all. However, this was not a major problem as the software is fairly self-explanatory and very easy to use by anyone who has ever filled out their own forms before.

For married filers, Spectax automatically keeps married filing separately and married filing jointly calculations which allows those in this situation see which way offers the greatest tax advantage.

Lackings of the program are no documentation and no way to save your results on tape (though you might try breaking into the program after all data entry and save the whole thing to tape). But this is one program that is definitely better and quicker than using a pencil and calculator.

My recommendation is that you buy this program if you fill out your own tax forms and have a 2068. Poretsky & Poretsky, Inc. is a tax firm with many years experience and it shows in the ease with which this program helps you file your tax return.

-- Richard Cravy

Beginner's Programming, III

This month, let us first personalize our program. Clear the screen and ask your student to type his name. The name is ENTERed into a string variable and can be used any place in the program by calling the string variable.

```
3000 CLS
3005 PRINT AT 10, 4;"<--type you
r name-->"
3010 INPUT "your name";f$
3050 CLS
3060 PRINT AT 4,8;"Hello, ";f$
```

-Note- The 2068 lets you enter a prompt in your input statement in line 3010. I will use this format in the future. If you are using a 1000 series just ignore the prompt. Have you given numbering the problems any thought? A variable needs to be assigned and initialized to do our counting for us. Tell the computer where to place the number. Since we need to add 1 to our variable for each problem, let's start our variable value at 0. We also need a clean screen for each problem.

```
3040 LET c=0
3350 CLS
3340 PRINT AT 3,2;"No. ";c+1
3370 CLS
```

This line clears the number with the problem. EDIT line 3380.

```
3380 PRINT AT 3,2;"No. ";c+1; AT
6, 0;x;"+";y;"= ";z
3430 LET c=c+1
```

The correct answer routine works with the numbering routine and allows us to give the number of correct answers out of a given number. Assign and initialize a variable; decide number of problems to a series and increment the answer number.

```
3020 LET a=0
3330 IF c=10 THEN GOTO 1200
3440 LET a=a+1
```

The routine at line 1200 not only gives the number correct but also reinitializes the variables and asks if the student wishes to practice more.

```
1200 PRINT AT 10,6;"You got";a;"
out of ten."
1210 LET c=0
1215 LET a=0
1220 PRINT AT 12,3;"Would you li
ke another play?"
1230 PRINT AT 14,3;"press y or n
followed by ENTER"
1240 INPUT "y/n";b$
1250 CLS
1260 IF b$="y" OR b$="Y" THEN
GOTO 3070
1280 CLS
1290 PRINT AT 8,5;"Thank you for
 playing, "; AT 10,5;f$
1300 PAUSE 200
1305 CLS
1310 STOP
```

You can EDIT the lines to the other parts of the program where they are needed.

Next month we will start on our LOGO. There is a smiley face if the answer is correct and a frowney face if the problem is wrong. Every child of any age that I have used this program with has enjoyed the fast feedback on his or her answers. Some have deliberately answered wrong just to see the frowney face develop.

-- Bill Woodward

Beginner's Programming
(Part IV)

This month we will start tying a lot of loose ends together. Since the TS-1000 and the 2068 use different commands to draw the face, we will start with the TS-1000:

```
 850 GOTO 3000
 852 SLOW
 855 FOR N=1 TO 20
 860 PLOT 15*SIN (N*PI/10)+33,10
*COS(N*PI/10)+22
 865 NEXT N
 870 STOP
```

RUN this part of the program. In line 860, try swapping 10* and 15* and RUN or use 10* twice and RUN. Use the face you like best. Now lets add the eyes, nose, and mouth:

```
 870 PLOT 28,26
 875 PLOT 38,26
 880 PLOT 31,22
 885 PLOT 34,17
 890 PLOT 33,17
 895 PLOT 32,17
 900 PLOT 31,18
 910 PLOT 35,18
```

On the 2068, we use:

```
 850 GOTO 3000
 860 CIRCLE 120,88,40: CIRCLE 12
0,88,2
 880 CIRCLE 105,98,5: CIRCLE 130
,98,5
 890 CIRCLE 105,98,2: CIRCLE 130
,98,2
 900 PLOT 104,78
 910 DRAW 30,0,.8*PI
```

On both models add:

```
 920 PRINT AT 8,0;"CORRECT, ";AT
10,0;F$
 930 PAUSE 300
 935 CLS
 940 RETURN
 950 STOP
3390 IF X+Y=Z THEN GOSUB 860
3350 PRINT AT 6,0;X;"+";Y;"=?"
```

That "draws" a smiley face when ever a correct answer is given. For wrong answers, the following routine "draws" a frowney face on the screen. First the 1000:

```
1000 FOR N=1 TO 20
1005 PLOT 15*SIN (N*PI/10)+33,10
*COS (N*PI/10)+22
1008 NEXT N
1010 PLOT 28,26
1015 PLOT 38,26
1020 PLOT 33,22
1025 PLOT 35,16
1030 PLOT 34,17
1035 POLT 33,17
1040 PLOT 32,17
1045 PLOT 31,16
```

For the 2068:

```
1000 CIRCLE 120,88,40: CIRCLE 12
0,88,2
1020 CIRCLE 105,98,5: CIRCLE 130
,98,5
1030 CIRCLE 105,98,2: CIRCLE 130
,98,2
1040 DRAW -30,0,.8*PI
```

On both models:

```
1150 print at 8,0;" TOO BAD, ";A
T 10,0;F$
1160 LET A=A-1
1170 PAUSE 300
1180 CLS
1190 RETURN
3400 IF Z<>X+Y THEN GOSUB 1000
3410 IF Z<>X+Y THEN GOTO 3350
```

This last part is your examination. The first 19 lines of the program are duplicated for the other model. The object of this test is to sort out the lines for your computer. For the TS 1000, you may have to split up some lines, like line 10. Remember that the program autoruns on line one.

```
  10 CLS : PRINT AT 2,10;"SMILEY
 FACE"
  20 PRINT AT 20,10;"BILL WOODWA
RD"
  30 PRINT AT 10,1;"PUBLIC";TAB
25;"DOMAIN"
  40 BORDER 3: PAPER 6: INK 0
  50 FOR M=0 TO 30: PRINT AT 0,M
;"+": NEXT M
```

```
  60 FOR N=1 TO 20: PRINT AT N,0
;"/": NEXT N
  70 FOR O=0 TO 31: PRINT AT 21,
O;"-": NEXT O
  80 FOR P=1 TO 21: PRINT AT P,3
1;"*": NEXT P
  90 CIRCLE 112,98,5: CIRCLE 137
,98,5: FLASH 1: CIRCLE 112,98,2:
CIRCLE 137,98,2
 100 FLASH 0: PLOT 111,78: DRAW
30,0,.8*PI
 110 CIRCLE 127,88,50: PRINT AT
10,15;"B"; AT 11,15;"Y": CIRCLE
127,88,2
 120 CIRCLE 48,32,20: PLOT 48,32
: PLOT 43,37: PLOT 53,37: PLOT 4
3,25: DRAW 9,0,.8*PI
 130 CIRCLE 207,32,20: PLOT 207,
32: PLOT 202,37: PLOT 212,37: PL
OT 203,25: DRAW 9,0,.8*PI
 140 CIRCLE 48,143,20: PLOT 48,1
43: PLOT 43,148: PLOT 53,148: PL
OT 43,140: DRAW 9,0,.8*PI
 150 CIRCLE 207,143,20: PLOT 207
,143: PLOT 202,148: PLOT 212,148
: PLOT 202,140: DRAW 9,0,.8*PI
 170 PAUSE 200
 180 FLASH 1: PRINT AT 20,5;"PRE
SS ENTER TO CONTINUE"
 190 PAUSE 0: FLASH 0
```

And...

```
  50 SLOW
  60 FOR N=1 TO 20
  70 PLOT 15*SIN (N*PI/10)+33,10
*COS (N*PI/10)+22
  80 NEXT N
  90 PLOT 28,26
 100 PLOT 38,26
 110 PLOT 33,22
 120 PLOT 35,18
 130 PLOT 34,17
 140 PLOT 33,17
 150 PLOT 32,17
 160 PLOT 31,18
```

Programmer's hint: on the TS 1000, use a FOR - NEXT loop instead of PAUSE. The FOR - NEXT loop gets rid of the flickering that PAUSE causes. For example, instead of PAUSE 1000, use:

```
FOR N=1 TO 1000
NEXT N
```

This completes the program, "SMILEY FACE". If you make any improvements, please send them to SUM Magazine. There are a lot of ways to improve this program. Most young people that I have shown this to have really enjoyed it with the positive feedback it provides to the proper answer.

--Bill Woodward

NEWS AND NOTES!

E-Z KEY has just announced that they now have available a keyboard interface module that allows a keyboard to be plugged into the rear expansion connector on your ZX 81/TS-1000/TS-1500 or the 2068. The module will allow you to add a keyboard, joystick, or numeric keypad. It comes complete with a keyboard schematic. They have a KBI-1 for the TS-1000 and the KBI-2 for the 2068. Price is $39.95 + $2.95 s&h. E-Z KEY, Suite 75A, 711 Southern Artery, Quincy, MA 02169

TS Connection, 3832 Watterson Avenue, Cincinnati, OH 45227; 513-271-5575 Has the 2068 technical manual for immediate shipment for $25 + UPS charges.

Most major Wilson department stores in Florida still have the 2068 and 2040 printer + 4 software tapes for $149. Few, if any, still have the 2068 alone for $69. Stores we know for sure that have them are in Tallahasee, Jacksonville, Daytona Beach, Orlando, and Tampa. Unfortunately, they won't ship them out. You must walk in to get them.

A & J Microdrive Review

Its been out for three months now, its easy to use, and its fast! The A & J Microdrive has been a long awaited peripheral which is the best thing to come along since the 2068 itself!

The drive is housed in an attractive 2 3/4 x 4 3/4 x 7 inch black case and is connected to the interface by a 16 inch ribbon cable. The interface looks like the old Memotech interfaces for the ZX81. It measures 2 x 6 3/4 x 3/4 and has an expansion card edge out the rear and another card edge out the top for a soon to be released printer cable. Also out the rear are two sockets designated for drives 0 and 1.

Up to 2 drives can be connected at once with a simple POKE to change the drive you want to access. The drives are accessed the same way as a cassette is, by LOAD, SAVE, and VERIFY. One of the nicest features of the drive is the fact that it takes up no user RAM. The Sinclair microdrive and Rotronic's wafadrive both use a good bit of memory for their operating system which means that some programs cannot be transferred over to wafer due to the amount of memory they take up.

The "@" symbol as the first character in a file name signifies to the computer that the microdrives are to be used instead of a cassette. Example: LOAD "@star" loads a program named "star".

When getting started, the first thing that must be done is format the microwafer; this must be done to all microwafers before they are used. Once done, it need not be done again unless you want to erase all information on a wafer.

Once formatted, the wafers are ready for use. SAVEing a file is done by giving each file a number starting with 1, then 2, etc. It is important to remember that you must save the files in order. You can't save file 4 when you have never saved a file 3 on that particular wafer. Typically, you have nine files you can save on a wafer (1-9), but more can be saved per wafer if needed by following the instructions provided in the addendum to the User's Manual. A typical save instruction would look like this: SAVE "@1,sample". It means save the file named "sample" as file #1 on the microdrive.

You have all the load and save options as you do with cassette, but the filename can be no longer than 7 characters. To load a program, you must always give the entire file name. LOAD "" or LOAD "@" won't load the first file it finds like with cassette. Here is a typical command: LOAD "@sample". Notice you don't have to remember the file number on loads. You can have the microdrive and cassette connected to the computer at the same time and access them both.

To see what is on a wafer, use LOAD "@". This will cause the drive to look for a non-existent file and list all files searched to the screen. When resaving a revised file, you must make sure that the revised file is no longer than the first version of that file, or you may write over the first part of the next file (if any) saved.

If you are planning to revise a file and want to save other files thereafter, create a dummy variable and dimension it to a length that will cover any future revisions. Use something like DIM x(1000) then save the file and any others afterwards. This will set aside extra room for future revisions. Just make sure that you CLEAR this variable when you go back and add to that file. Always try to keep track of how many bytes you have used in your program by using the FREE command. Of course the obvious solution to all of this is to store only one file per wafer. Use short wafers. This will also cut down on SAVE and LOAD time. The 20 ft wafer holds 28K which is more than enough for any one single program.

Now for a speed test. Formatting takes the longest since the drive

searches for the splice in the "endless tape" and writes a end of file mark, and then goes thru the tape again and marks the other end; then it knows where to put a file without writing over the splice. Formatting can be used to erase the whole tape. Formatting a 35 ft. wafer takes 1 minute 18 seconds.

Saving a full 48K (capacity of a 35 ft wafer) takes 43 seconds and loading takes 48. Of course this was under ideal conditions because I ended just before the file began, so upon loading, the file was right there. If the file you wanted has already been passed, you would have to wait for the drive to search through the entire tape before it found the file you are seeking. In more understandable terms, I can be up and running Tasword in less than 25 seconds! See Tasword to wafer conversion in this issue. With the speed about 6 times that of a standard cassette, LOADing a SCREEN$ is fun; it takes 5 seconds!

You can protect a wafer by knocking out the write protect tab on the side. An error code of O, Invalid Stream, is reported if you try to SAVE to a write protected wafer. You can also get an error code when you try to save a file when there isn't enough room on the wafer, when you use an invalid file name, when there is a tape loading error and when you press BREAK. And you get the satisfying 0, OK report for a successful operation.

A ribbon cable and software for word processing should be available by the end of March according to Jim Howell of A & J Microdrive. The kit will have a centronics printer cable, software on wafer, and an IC chip which must be installed; the kit will sell for $49.95.

If you feel like experimenting, the parallel port is mapped to port 66 of the 2068. The signal pins are visible from the front and starting at finger marked 25 are STROBE, DATA 1-8, unused finger, BUSY. The rest on the front side are unused. The backside fingers are grounds except 2 which has no connection. Jim also told me that they are negotiating the buying of Entrepo, the company that manufactures the wafers which should help in bringing down the prices on wafers (now average around $4.50 each).

I dread the times when I load a tape on my ZX81 or 1500; now I also dread the times when I have to use a cassette on the 2068! I have been quite pleased with my drives so far, and even at $200, a good deal. They are the only microdrives out right now which operate in 2068 mode. The others all require a Spectrum emulator. I do wonder why the units are black! Why can't it be silver like the rest of the 2068 line? That goes for any interfaces that come out for the 2068.

-- Joe Williamson

Hardware/Software

User Defined Graphics for the TS-1000

Your own custom graphics for less than $10? With just three IC chips, and a few extra parts, you can add a modification that allows you to change all 64 of the standard ZX/TS characters. To better understand the modification, we need to take a look at how the ZX/TS displays characters.

To generate a display with a minimum of parts, the ZX/TS uses a complex interaction of hardware and software. For our purposes however, we just need to know how a character is generated.

Character pattern data is stored in the system ROM in locations 7680 to 8191. These 512 bytes are divided into 64, eight-byte sections, i.e., one character per 8 bytes. This pattern data is like an 8 X 8 matrix with the rows being the memory locations, and the columns, the bit locations. For example, the bit pattern for the graphic character on key one is shown below:

Location	Byte	Decimal
7688	11110000	240
7689	11110000	240
7690	11110000	240
7691	11110000	240
7692	00000000	0
7693	00000000	0
7694	00000000	0
7695	00000000	0

If you PEEK these locations, you will get the decimal number. To convert from binary to decimal, add the proper weighting if a one is found. For example, decimal 240=1*2^7 + 1*2^6 + 1*2^5 + 1*2^4.

This pattern of 1's representing dots holds except for the shaded characters (codes 8,9, and 10). Shading is indicated by a decimal 170 in the pattern location. Inverse characters (codes 128 to 191) are derived from the first 64 characters.

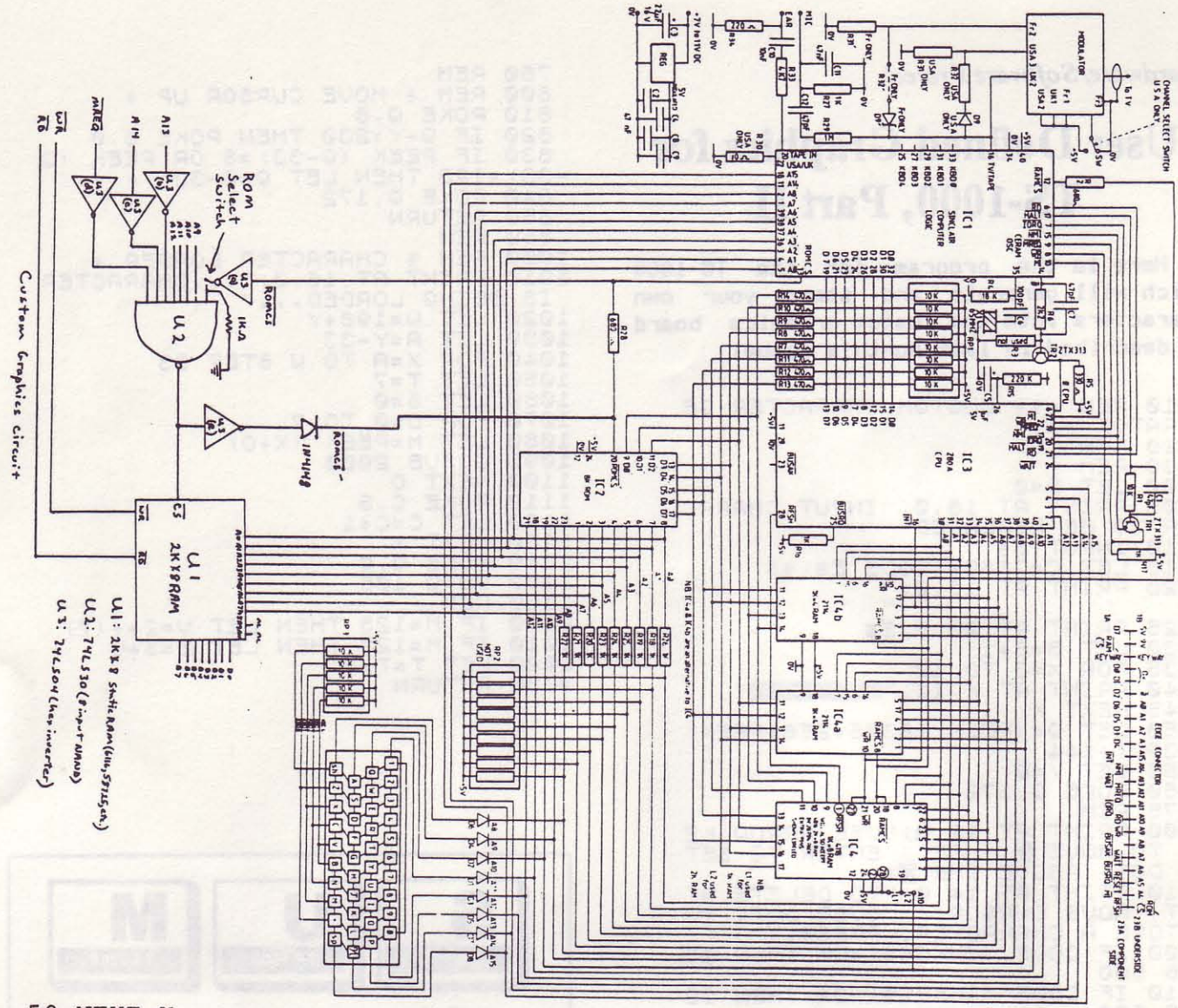
While in the display mode, the sinclair logic chip (ULA) addresses the system ROM directly to obtain the pattern data. This is the reason for the nine 1K ohm series resistors (R18 - R26) on the ROM address lines. Because of the resistors, we must use these lines (A0' - A8'), and not the address lines found on the rear edge connector. When the ULA wants pattern data, it pulls ROMCS low. This line is connected through a 680 ohm resistor (R28) to ROMCS', which is connected to pin 20 of the ROM. ROMCS' is also available on the rear edge connector.

When our custom graphics circuit is switched in, and addresses 7680 to 8191 are used, the output of the 74LS30 goes low and enables the 2K X 8 custom graphics RAM. This also pulls ROMCS' high, through the inverter and diode, to disable the system ROM. With the RAM switched in, we can change the contents to create our own pattern data.

I built the custom graphics circuit on a small Vector board. A 24-pin wire wrap IC socket was used with the pins sticking through the board. This way, the vector board can be plugged into the ROM socket, and the ROM plugged into the wire wrap socket. If you have space limitations from other modifications, ribbon cable brought out of the rear edge connector slot will work as well. Don't get ROMCS from the ULA confused with ROMCS' found on the other side of R28. Care should be used when handling the IC chips, and when soldering on the computer circuit board.

When the circuit is built and checked for proper connections, turn on the ZX/TS. With the custom graphics off, the computer should work normally. When the graphics RAM is switched in, the screen should fill with black verticle bars. This is because the RAM needs to be initialized. With the custom graphics off, type in:

```
10 LET Y=18000
20 FOR X=7680 TO 8191
30 POKE Y, PEEK X
40 LET Y=Y+1
```




```
  50 NEXT X
FAST
RUN
```

Note that this is for 16K users. Now edit line 30 to read:

```
  30 POKE x, PEEK y
```

Switch in the graphics and then RUN. When finished, you should be able to switch the custom graphics in and out and see no difference on the screen. The custom graphics is now ready for use.

As an example, replace the graphic character on the 1 key with a right triangle. The pattern location for any character will be from 7680 +(CODE"n")*8 to 7680 +(CODE"n")*8+7, where n is any character you wish to replace.

Location	Byte	Decimal
7688	00000001	1
7689	00000011	3
7690	00000111	7
7691	00001111	15
7692	00011111	31
7693	00111111	63
7694	01111111	127
7695	11111111	255

Just POKE in the decimal numbers at the specified locations. In this way, any character can be made. Two or more characters can be used next to each other to create many more new patterns. Note that when you turn the computer off, you will lose your new characters. You can save your new characters by storing them in a REM statement, or in variables.

Next month I will list a program that will allow you to build your characters on an 8 X 8 grid and then automatically convert them down to a single character.

--Dan Fagen

Hardware/Software Project

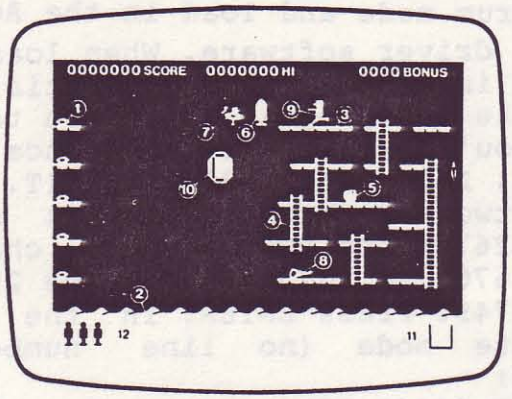
User Defined Graphics for TS-1000, Part II

Here is the program for the TS-1000 which will generate and store your own characters into the custom graphics board as described in last month's issue:

```
  10 REM *** CUSTOM CHARACTER GE
NERATOR ***
  20 REM
  30 REM
 100 LET B=0
 105 PRINT AT 18,0;"INPUT CHARAC
TER TO BE REPLACED"
 110 INPUT E$
 115 LET C=7680+(CODE E$)*8
 120 PRINT AT 18,0;"
                   "
 125 PRINT AT 20,B;E$
 130 LET B=B+1
 135 FOR X=3 TO 10
 140 PRINT AT X,11;"▒▒▒▒▒▒▒▒"
 145 NEXT X
 150 LET Q=(PEEK 16396+256*PEEK
16397)+144
 155 LET Y=Q
 160 POKE Q,172
 175 REM
 300 PRINT AT 12,0;"USE ARROW KE
YS TO MOVE ▒, USE    ENTER TO SET
 A DOT (ABOVE THE ▒)"
 310 PRINT AT 14,0;"TO DELETE A
DOT, MOVE CURSOR     OVER DOT, TO
 STORE A CHARACTER, PRESS Z"
 400 IF CODE (INKEY$)=36 THEN GO
SUB 500
 410 IF CODE (INKEY$)=34 THEN GO
SUB 600
 420 IF CODE (INKEY$)=33 THEN GO
SUB 700
 430 IF CODE (INKEY$)=35 THEN GO
SUB 800
 440 IF CODE (INKEY$)=118 AND PE
EK (Q-33)=8 THEN POKE (Q-33),128
 450 IF CODE (INKEY$)=63 THEN GO
TO 1000
 460 GOTO 400
 470 REM
 500 REM * MOVE CURSOR RIGHT *
 510 POKE Q,8
 520 IF Q-Y>205 THEN POKE Q,Q
 530 IF PEEK (Q+1)=8 OR PEEK (Q+
1)=128 OR Q-Y>230 AND Q-Y<238 TH
EN LET Q=Q+1
 540 POKE Q,172
 550 RETURN
 560 REM
 600 REM * MOVE CURSOR DOWN *
 610 POKE Q,8
 620 IF Q-Y<230 THEN LET Q=Q+33
 630 POKE Q,172
 640 RETURN
 650 REM
 700 REM * MOVE CURSOR LEFT *
 710 POKE Q,8
 720 IF Q-Y>205 THEN POKE Q,Q
 730 IF PEEK (Q-1)=8 OR PEEK (Q-
1)=128 OR Q-Y>231 THEN LET Q=Q-1
 740 POKE Q,172
 750 RETURN
 760 REM
 800 REM * MOVE CURSOR UP *
 810 POKE Q,8
 820 IF Q-Y>230 THEN POKE Q,Q
 830 IF PEEK (Q-33)=8 OR PEEK (Q
-33)=128 THEN LET Q=Q-33
 840 POKE Q,172
 850 RETURN
 860 REM
1000 REM * CHARACTER LOADER *
1010 PRINT AT 18,0;"...CHARACTER
 IS BEING LOADED..."
1020 LET W=198+Y
1030 LET A=Y-33
1040 FOR X=A TO W STEP 33
1050 LET T=7
1060 LET S=0
1070 FOR O=0 TO 7
1080 LET M=PEEK (X+O)
1090 GOSUB 2000
1100 NEXT O
1110 POKE C,S
1120 LET C=C+1
1130 NEXT X
1140 POKE Q,Q
1150 GOTO 105
1160 REM
2000 IF M=128 THEN LET V=2**(T)
2010 IF M=128 THEN LET S=S+V
2020 LET T=T-1
2030 RETURN
```

Software Review

Rocket Man



1. Diamonds
2. Sea
3. Platforms
4. Ladders
5. Fuel Cans
6. Rocket
7. Vulture
8. Leg of Lamb
9. Player
10. Bubloid
11. Fuel Gauge
12. Men remaining

This TS-1000 (16K) game is truly one that makes you wonder why you put aside this computer for bigger and better things. It uses high-res graphics equal to that of the 2068! And just as fast, all under software control -- no modifications needed.

The idea is to gather as many diamonds as possible by going over shark infested waters and trying to avoid a bubble which keeps trying to get you in it and dumping you into the sea below (something like the old "The Prisoner" TV show). The only way to get over to the diamonds is by jet pack. Before you can use the jet pack, you must gather sufficient fuel for the journey. I found that you need to collect about 4 cans just to make it across the ocean. A fuel gauge tells you how much you have left.

There are six stages to the game with a different platform layout in each game. Each platform has a ladder that extends to the next platform (similar to Donkey Kong), and on random platforms are the fuel cans you must collect. In stages 4-6, the jet pack changes into a vulture, and you must collect leg of lambs instead of fuel cans (to feed the vulture)! With each stage, the bubble homes in on you much faster, so you must keep moving to avoid it.

The Q and Z keys move you up and down the ladders respectively, and the B and M keys move you left and right. The A key makes you jump to avoid the holes in the platforms and to provide thrust while flying around with tne jet pack or vulture. If you prefer other keys, you can define your own at the beginning of the game. A pause key is also available.

I was very impressed with the graphics in this game and the response to the keys was very quick. I understand that there are quite a few games out now that have the hi-res under software control, but this is the first that I have seen. A must for the devoted ZX 81/ TS 1000 fan.

ROCKET MAN is available from Curry Computer, 5344 W. Banff, Glendale, AZ 85306; 602-978-2902 for $10.95 ppd.

--Joe Williamson

Tell them you saw it in SUM

Loading Tasword II on the A & J Microdrive

Using the A & J Microdrive to load Tasword II takes less than 30 seconds! But to SAVE the program and files created by it requires some modifications to the BASIC part of Tasword II.

To make the changes, LOAD Tasword off tape and choose the BASIC option. DELETE lines 11, 15, 700 and 710. Now add the following lines:

```
15 POKE VAL "23609", VAL "2": CLEAR
VAL "33279": GO SUB VAL "4000":
LOAD "@tasword"CODE: CLS: LET a=USR
VAL "59061": GO TO VAL "10"

700 CLS: LET a$="@tasword": SAVE
"@1,tasword"LINE 15

710 SAVE "@2,tasword"CODE 54784,
10751

1060 IF a$(1)<>"@" THEN GO TO 1100

1070 LET a$(2 TO )=a$(4 TO )
```

These changes allow you to use either cassette or microdrive for saving files. Just remember to begin files for the microdrives with @ and the number of the file followed by a comma and the file name up to 7 characters long. Files without the @ will save to the cassette. (Example: @1,sample)

To SAVE Tasword to microdrive after the above changes GO TO 1 and then select the "Save Tasword" option. Save it on a 20' cartridge with no other files on it.

To LOAD Tasword, type LOAD "@tasword" RETURN.

-- Joe Williamson

Aerco Interface with the Spectrum Rom

If you have converted your 2068 to a Spectrum and have the Aerco parallel printer interface, here are the changes needed to run the print driver software supplied with the interface while in Spectrum mode.

First place your computer in Spectrum mode and load in the Aerco print driver software. When loaded, break into BASIC (don't initialize it like the program tells you to do - you'll just crash). Once in BASIC, LIST line 9992 and EDIT. On line two and three where it says POKE 26704 and POKE 26703, change the 26704 to 23750 and change 26703 to 26749. Press ENTER. In the immediate mode (no line numbers) enter:

```
POKE 64441,201
POKE 64521,84
POKE 64522,31
```

Now run the program with GOTO 1 and choose the initialize routine. You are now set up to drive your printer while in Spectrum mode! Be sure you save this new version.

--Joe Williamson

Converting Textwriter Files to Tasword II Files

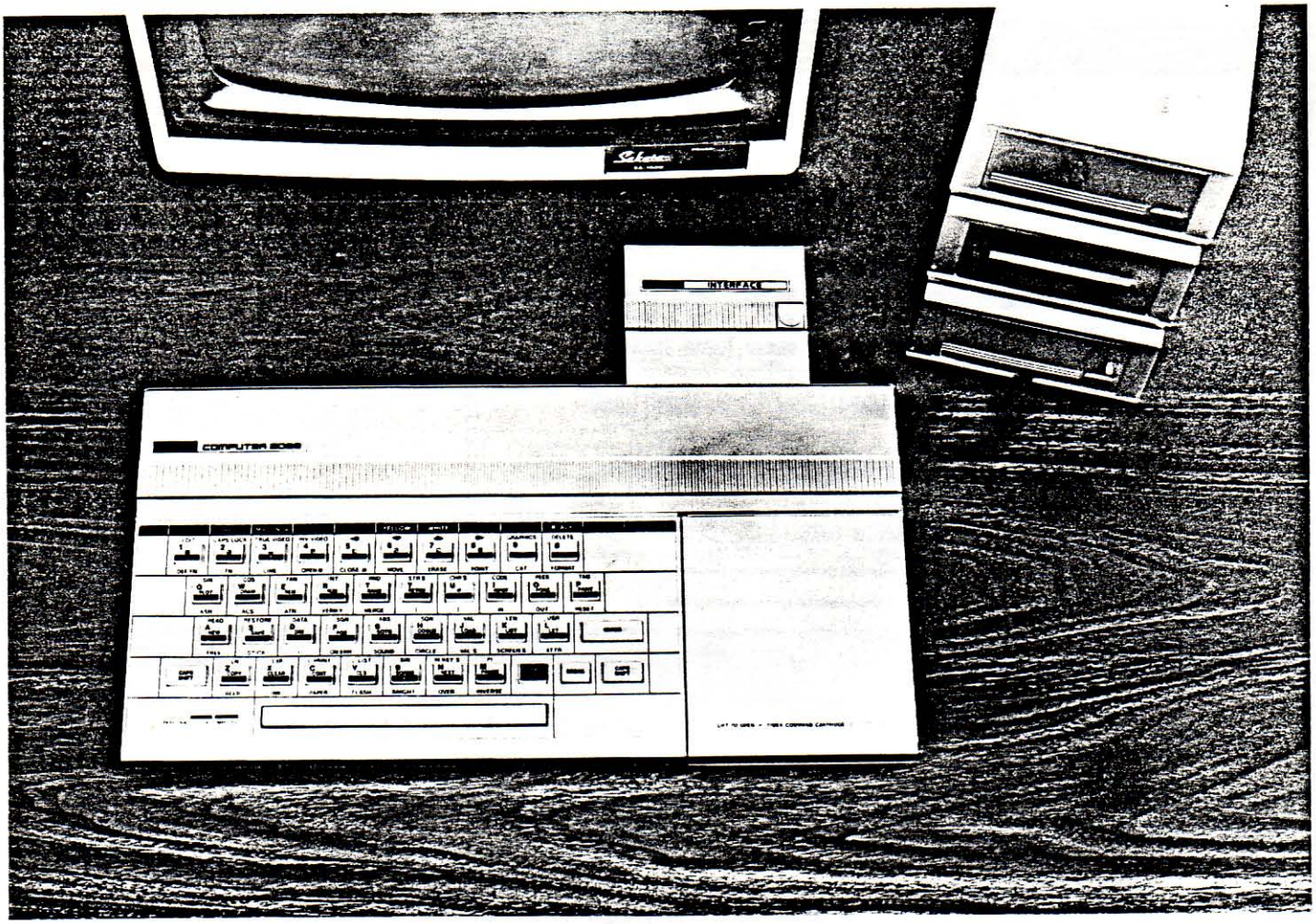
I wished to upgrade a three page essay that I had written several months ago on the Textwriter word processor. The only catch was I am now using Tasword and preferred using it over Textwriter. I did not relish the idea of retyping the essay, so I scanned the leader of the Textwriter text code with HEADSCAN (SYNTAX, Sept 1984) and noted the address and byte count of the essay. I then scanned a Tasword text code tape to find the loading address. The two addresses were, of course, different. The Tasword text code is loaded to address 33280.

I loaded Tasword and broke into BASIC and entered:

```
LOAD ""CODE 33280
```

with the Textwriter code in the tape recorder. After loading, I re-entered Tasword and much to my happiness, there was the essay I had written so long ago.

--Bill Woodward

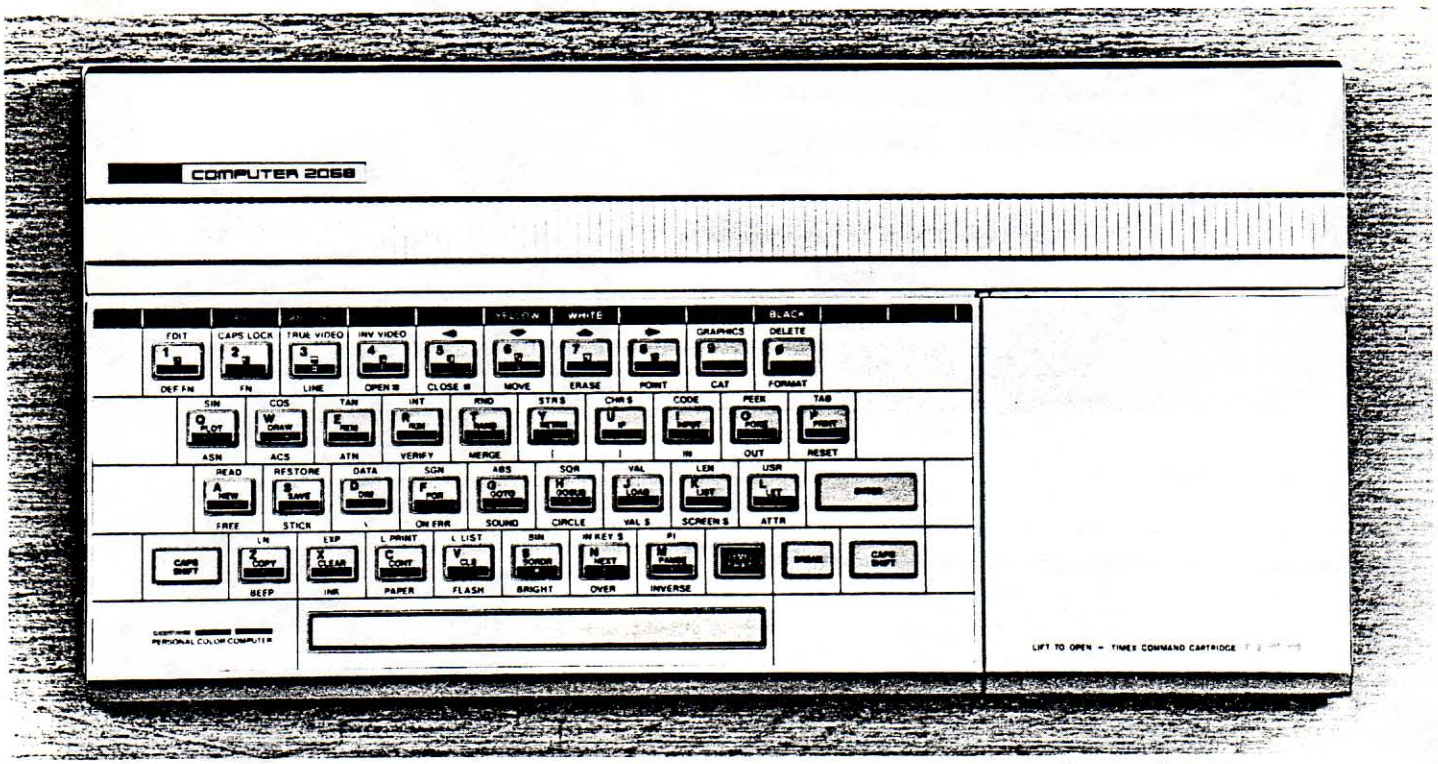


Portuguese Timex T-2068 Computer & Timex Disk Drive System: *A Hands-On Evaluation*

Timex is still in the home computer market--in Europe! When Timex bowed out here in early 1984, their computer manufacturing facilities in Portugal continued their work, primarily, so everyone believed, manufacturing for Sinclair in England. Apparently, this was only partly true. Their research and development department was still at work, perfecting the products only hinted at before Timex bowed out.

This issue of SUM is partly devoted to reviews of these new products. It is our understanding that Timex in Portugal is currently selling the computer in Portugal, and has the disk drive system for sale in both England (for the Spectrum) and in Portugal. We do not presently have any undisputed indication that they will come to the American market. There is also no connection with the coming QL computer from Sinclair.

Through the courtesy of Timex in Portugal and the invaluable help and persistence of Bob Dyl of English Micro Connection in Newport, Rhode Island, SUM has been able to acquire the following computer equipment for evaluation: a Timex single disk drive system, a new version of the Timex 2068 computer, and a Timex Emulator Cartridge. None of these products are presently for sale in the U.S. They



The keyboard looks the same, except for the name in the upper left corner. The real differences lie inside.

are expected in the future. More details will given further on in this article.

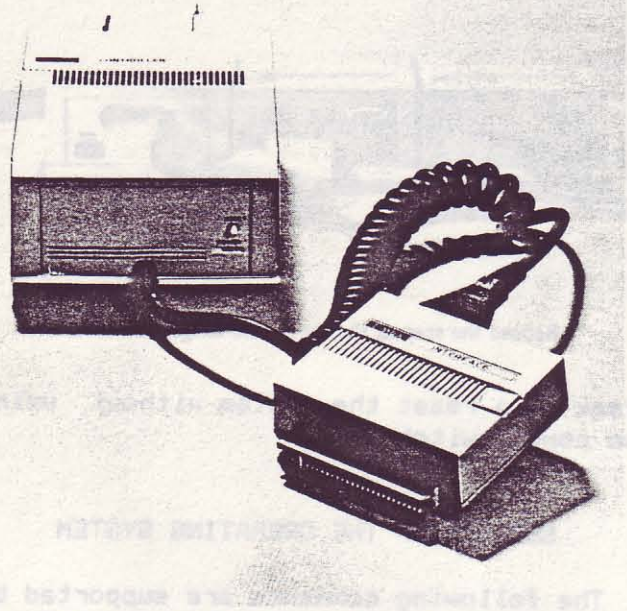
THE HARDWARE

The Timex 2068 computer appears to be a Timex/Sinclair 2068 with only the name in the upper left corner changed. I say, "appears" because, in fact, it is a different computer in several ways. First is the fact that the rear edge connector is not TS-2068 compatible; it is a Sinclair Spectrum pin-out. Shipped with the computer is one of Timex's small plug-in cartridges (goes under the Timex Command Cartridge door on the right hand side of the computer) which makes the Timex 2068 highly compatible with the Spectrum when it is plugged in. When removed, the T-2068 runs TS-2068 software.

Visions of running the Emulator cartridge on my TS-2068 ran through my head as well, but investigation shows that the emulator cartridge has been made tall enough that it won't fit into the slot of the American machine; it's just as well as it turns out, since the Emulator does not work with American machines.

The case and keyboard are identical other than the taller slot for the Emulator cartridge. Opening the Portuguese computer also reveals major differences. The circuit board is much smaller, and is dominated by a few large scale integrated circuits which must incorporate many of the discreet resistors and capacitors and other parts on the American machine. The RF modulator is of a different design, and the output on our monitors and television was much "cleaner" and steady. The one machine we tested did seem to have a slightly weaker output signal on the monitor than the TS-2068. The Portuguese computer uses a 9 volt power supply instead of the 15 volt sold in America.

The disk drive system consists of three identical sized boxes approximately 5" wide by 6 1/4" deep by 2 3/4" tall. They contain the power supply, disk controller, and disk drive. In addition, the appropriate interface is provided which plugs into the rear of the computer. Three versions of the interface are said to exist,



Disk drive controller box and plug-in interface

two of which we tested. Versions for the Spectrum and the Portuguese T-2068 we ran through their paces. We have not seen the interface that adapts the drive system to the American TS-2068. Various cables also protrude from the three boxes connecting the power supply to the controller and drive. Another cable from the rear of the controller box connects to the disk drive. A second coiled cable comes from the front of the controller and plugs into the interface.

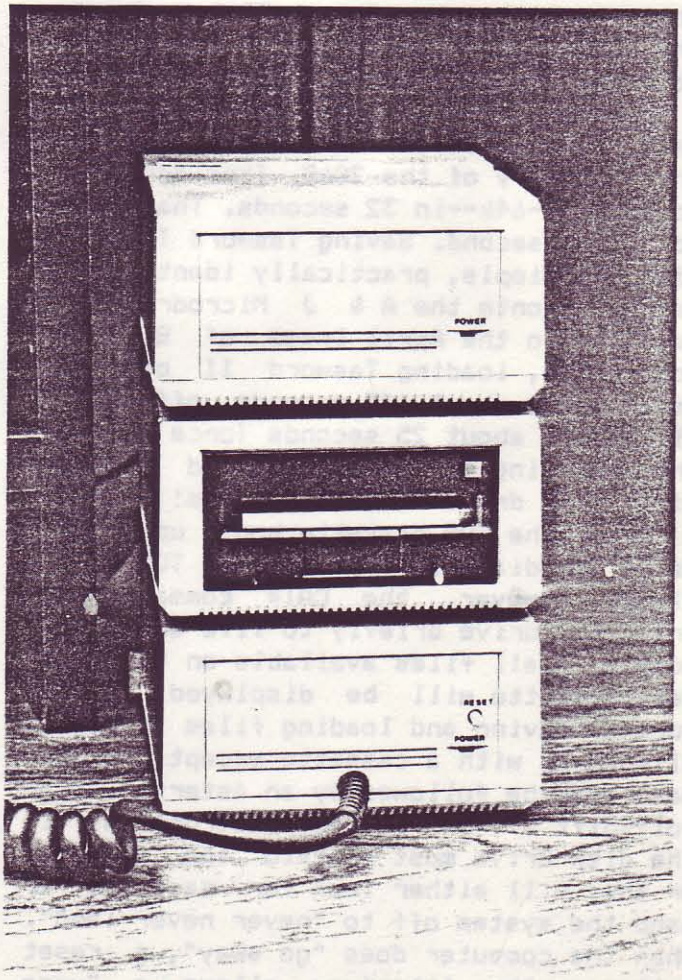
Having the drive system spread out over three boxes and an interface is a mixed blessing. The snarl of cables keeps things untidy looking in the back, accentuated if you are also using one or both of the RS-232 interfaces on the back of the controller box. They are also a bother to pick up and move. On the other hand, being small and separate gives you some variety in how you place them, though the cables which run between the boxes won't allow them to be separated by too much. They can be stacked on top of each other or set up on a shelf to leave more room on your desk top.

One real problem is the lack of any access to the rear edge connector when the interface is plugged in. This means, in my case, that I cannot run my printer with the disk drive since my printer has a centronics parallel interface. Unless you purchase a Y-connector, a serial-to-parallel converter, or a serial printer, you will have the same problem. (An exception to this is Joe Williamson's Foote Print printer interface which plugs into the cartridge slot of the TS-2068.)

UP AND RUNNING

The disk system connects up easily, but first time users may be a little unsure of themselves since the manual has no diagram or picture to accompany the written instructions. When powering up, the computer is turned on first. Then the power switch on the back of the disk power supply is flipped on. A prominent red light shows on the disk drive unit indicating its readiness. A 3" microfloppy comes with the system. It contains the disk operating system designated T.O.S. (Timex Operating System) and is self booting (loading) when slipped into the drive slot.

When the disk is inserted, the red light flickers off and on why the quiet drive loads the TOS. When booting is completed, the light goes off, indicating both that the operation is complete and



How the disk drive system stacks up

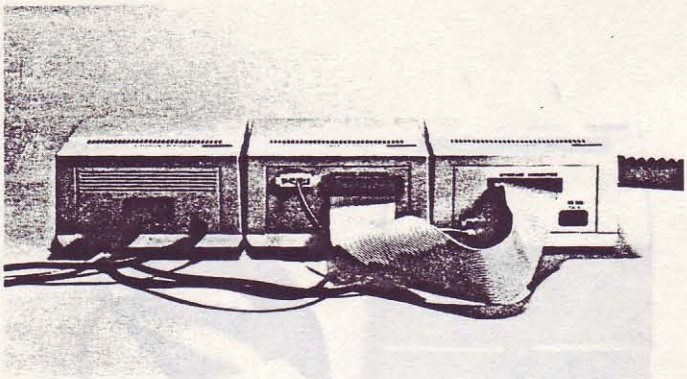
that it is now safe to remove the diskette if another one is to be used. The diskette itself is enclosed in a rigid plastic case and has a metal shutter covering all openings in to the magnetic surface. This shutter slides out of the way when the disk is inserted in the drive and closes as it is removed.

The disk drive is a Hitachi unit which is a wonder of miniaturization. This same drive was offered for a while in the U.S. but never caught on, losing out to the Sony drives used on the Apple Macintosh, Hewlett-Packard, and other computers. But it does seem to be quite popular in Europe as I see it advertised either available for or actually being used with a number of different computers there. TOS can handle up to 4 drives, though cabling is only supplied for two, and an extra power supply would be necessary. The drive is a single-sided (SS) model meaning it has one read/write head and operates on one side of the diskette. However, the diskettes can be turned over and the second side used.

Maximum storage capacity of the diskettes is 160k per side, or 320k each. When the operating system is saved on a disk, it leaves 140k of useable space on a side.

Access time, saving, and loading are fast. I was able to save everything thing in the memory of the 2068, from address 0 to Ramtop--64k--in 32 seconds. That comes to 2k per second. Saving Tasword II on to disk was simple, practically identical to saving it onto the A & J Microdrives as detailed in the April issue of SUM. For comparison, loading Tasword II off cassette takes about 105 seconds, off A & J Microdrive about 25 seconds (once it finds the beginning of the file), and off the Timex disk drive about 7 seconds!

After the TOS diskette boots up, there is no immediate indication that TOS is in place. However, the CAT* command will bring the drive briefly to life and a directory of all files available on the current diskette will be displayed on the screen. Saving and loading files is accomplished as with a cassette except the command must be followed by an asterisk (symbol-shift B). In fact all instructions to the disk drive must contain the asterisk or they will either look for cassette or send the system off to "never never land". When the computer does "go away", a reset button on the interface allows a "warm boot" of the system--that is, you can



Behind the scenes, the inevitable tangle of cables

break in a reset the system without using the power switch.

SECRETS OF THE OPERATING SYSTEM

The following commands are supported by TOS, all on the 2068 keyboard: ATTR*, CAT*, CLOSE#*, MOVE*, DIM*, ERASE*, FORMAT*, GO SUB*, GO TO*, INPUT*, LIST*, LOAD*, MERGE*, LET*, OPEN*, PRINT*, DRAW*, and SAVE*. An accompanying article details exactly what each command does.

The TOS is quite adequately explained in the manual accompanying the system. It consists of a 70 page 5 1/2" by 8" book. There are no photos or drawings in the manual and only one diagram (reproduced below). The original was produced on a dot matrix printer then offset printed. In spite of this, the text is quite readable. The book is divided into seven sections:

1. Introduction
2. Setting Up
3. TOS, Part I -- basic commands
4. TOS, Part II -- working with directories and Pathnames
5. Random Access and Sequential Files
6. Serial Communication Ports
7. Appendices
   - A. TOS Command Summary
   - B. Error Reports
   - C. Utility Programs
   - D. RS232C Link Ups
   - E. Error Trapping
   - F. Machine Code Tips

The main two failings of the manual are the lack of illustrations to make things easier, and the lack of an index which would greatly simplify locating just the information you need.

The manual is easy to read, and goes a good job of explaining several rather complex subjects, such as directories and pathnames. Further, it has several simple

TIMEX OPERATING SYSTEM (TOS) Commands

Here is a brief description of each one of the extended BASIC instructions provided by TOS. Each command is on the TS-2068 keyboard.

ATTR* -- must be followed by pathname and P or U or I or V. Protects or Unprotects a file (P or U) and makes it invisible or visible (I or V) to the CAT* command.

CAT* -- optionally followed by pathname to list on screen information on all the files and subdirectories defined in the current or pathname directory.

CLOSE#* -- must be followed by channel number between 1 and 16. Closes a file that was accessed after updating changes made while the channel was open.

MOVE* source pathname TO destination pathname -- Copies a source file to a destination file without destroying the source file.

DIM* -- must be followed by a pathname. Creates a file with the name specified, or a new directory if ".DIR" is appended to the pathname.

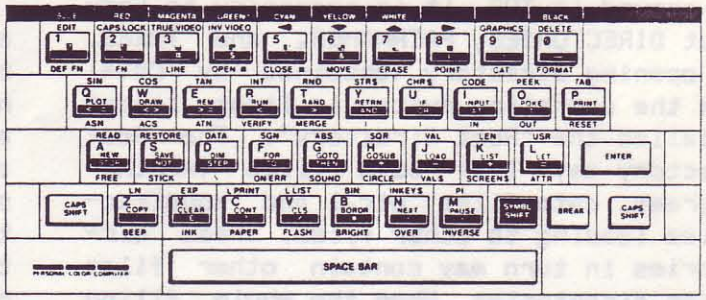
ERASE* -- must be followed by a pathname. Erases the file specified. Will generate an "Erase pathname (Y/N)?" for confirmation.

FORMAT* drive name TO disk name -- formats diskette not write protected by red tab on diskette. Erases all files on one side of diskette, places a copy of TOS on it, and names one side of diskette.

GO SUB* -- must be followed by pathname. Saves the current directory, accesses the specified directory or file, allows execution of whatever instructions are needed and returns to original file or directory when a DRAW* is encountered. Functions like GO SUB/RETURN.

GO TO* -- must be followed by pathname or drive name. Changes the current directory to that designated by the pathname. Works similar to GO TO in BASIC.

INPUT* -- must be followed by channel #. Reads a record from a file. Record number may be specified allowing random access to file records.



LIST* -- lists information on the current directory and on all directories stored in the stack. Information listed includes the pathname of the current directory, its level, and the drive being accessed.

When used with a channel number, lists extensive information about the channel open to a file including channel type, mode (input, output, random access or append), record length, current record, and file size.

LOAD* -- must specify pathname. Cannot load a directory; must specify any extensions such as ".BAS" or generates error report.

MERGE* -- must specify pathname. Merges a disk BASIC program and a program in the computer's memory.

LET* old pathname TO new pathname-- allows renaming a file.

OPEN#* channel number; pathname; mode -- opens a file and associates a channel number with it. Also specifies mode and optionally gives record length. Modes are input (i), output (o), random access (r), append (a).

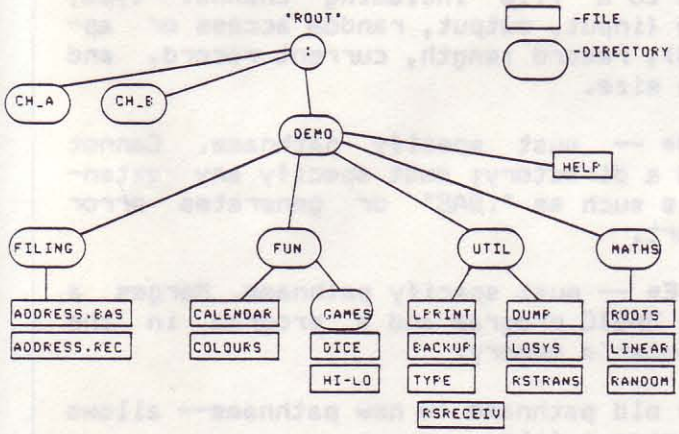
PRINT* -- writes to a file or serial port using the specified channel number.

DRAW* -- is used with the GO SUB* command.

SAVE* -- specify pathname. Used similarly to SAVE in cassette BASIC. If file name already exists on that diskette, will prompt that "Filename already exists" and asks if you wish to overwrite current file.

programs at appropriate places which really should be typed in by the beginner as they illustrate very well the intended point.

In order to understand how to use and get around in TOS, it is necessary to know about DIRECTORIES, PATHNAMES, and TREES. The opening directory (obtained by CAT*) when the operating system is first loaded is called the "Root Directory". The Root Directory may list both files (whether programs, data files, etc.) and subdirectories leading to other files. These directories in turn may contain other files and/or directories. When the whole filing structure of a diskette is considered it is called a TREE. Describing the path from the Root Directory down to the particular file you wish to access is called the PATH NAME. The accompanying diagram taken from the TOS manual illustrates this concept very well. The diagram is a map of the contents of Side A of the Operating System Disk which comes with the disk system.



Such a "hierarchic" structure allows an orderly arranging of files. Note in the diagram that Utilities are all under one directory, Maths under another, and Fun under a third.

When the disk is first booted, a CAT* will yield the following:

```
:DEMO
Level 0  Drive A

Name          Typ        Size    Alloc      S       P
-------------------------------------------------------
HELP          BAS       11087      11k               P
MATHS         DIR        3187       4K               P
FUN           DIR        6651       9K               P
UTIL          DIR        3075       7K               P
FILING        DIR        1070       2K               P

MAX 140K      CUR 33K     REM 107K

0 OK, 0:1
```

Compare this to the diagram. The Directory being viewed is designated first preceeded by a colon, that is ":DEMO". This is at "Level 0". One Basic program, "HELP.BAS", can be accessed, or four directories.

HELP.BAS may be loaded with LOAD* but entrance to the directories is possible using the CAT* (pathname) or GO TO* (pathname). An example (using diagram) would be accessing "DICE" by entering GO TO*":DEMO :FUN:GAMES". Calling for CAT* would now show "Level 2" and only two listings in the :GAMES directory. A total of 16 directories can be created and maintained on one side of a diskette. These can be arranged in practically any way including as directories inside other directories. In the diagram, 9 directories exist.

Files within directories are allocated a minimum of 1k of disk space. File names can be up to 8 characters plus a dot and a 3 character extension. All of the following are examples of legal file names:

```
A
CALENDAR.BAS
CALENDAR.COD
DICE
```

All file names are automatically converted to upper case characters. TOS automatically assigns ".DIR" to directory names and ".SCP" to serial communication port files. Looking at the listing above for the directory of :DEMO, there are 2 columns on the right side labelled S and P. If a file is open at the time a directory is called for, an "O" will appear in the S column. Since up to 16 files may be open at once for reading and/or writing from, this column shows which are open and closed at any given time. The P column shows if a file is protected. Protected files cannot be erased (except by FORMAT*) or written to, only read from. Files are protected or unprotected using the ATTR* command. This command also allows files to be created which are invisible to the CAT* command.

Though this overview does not do justice to the TOS, I am convinced that once this system is available to serious software producers, the Timex/Spectrum community will see business software far more powerful than anything possible today. By using the power of TOS to automatically open, close, read, write, append, and create up to 16 different files at once, powerful databases and complex management programs similar to those available to IBM PC users is possible. I use an IBM PC with

its PC-DOS and was immediately struck when I read the TOS manual by its similarity to PC-DOS while being easier to use!

An extensive list of 65 error messages is used by the system. Each is clearly explained in an appendix of the manual. They are quite specific and allow a quick diagnosis of mistake was made.

At present, four utility programs exist on the TOS diskette: BACKUP, LOSYS, DUMP, and LPRINT. BACKUP allows the copying of an entire diskette, sector by sector, to another diskette, even if only one drive is available. LOSYS allows updating to new versions of the operating system as they become available without loss of data on current diskettes. Each diskette has a version of TOS written to it when it is formatted. DUMP will dump the chosen file onto the screen, giving the hexadecimal bytes for each address and the ASCII equivalent. LPRINT activates serial port A on the back of the controller box so that the BASIC commands LPRINT and LLIST will drive a serial printer.

I had no way to check the functioning or uses of the two serial ports. The TOS manual provides several pages of information concerning opening and closing channels, transmitting and receiving data, connecting two Spectrums or T-2068s together and communicating, etc. It is very fascinating and the manual makes it sound very easy.

Two final appendices in the manual explain the use of error trapping and using TOS in machine code routines. Error trapping uses two otherwise unused system variables in the Spectrum and Timex: SYSERR and TRAP. The machine code tips detail accessing the TOS ROM without crashing the system. Those users who understand machine code programming will find these 3 pages of great value.

CONCLUSIONS

The Timex Disk Drive System and TOS may be the vehicle that can carry both the Spectrum in England and the 2068 in the U.S.A. on to their rightful place as standards in the small computer field. I cannot imagine any device, peripheral, or software that Timex or Sinclair could have introduced for these machines that could have a greater impact for good than this system. Once a user has worked with this disk system for 30 minutes, I do not believe he/she will truly be happy with anything less!

The system provides for a great deal of expansion. A notice on the bottom of the controller box, and mentions in the literature Timex shipped with the system, show that CP/M is already able to run on this setup with the addition of 48k more of RAM in the controller box. CP/M is the most popular operating system for 8 bit business computers and has thousands of programs written for use with it.

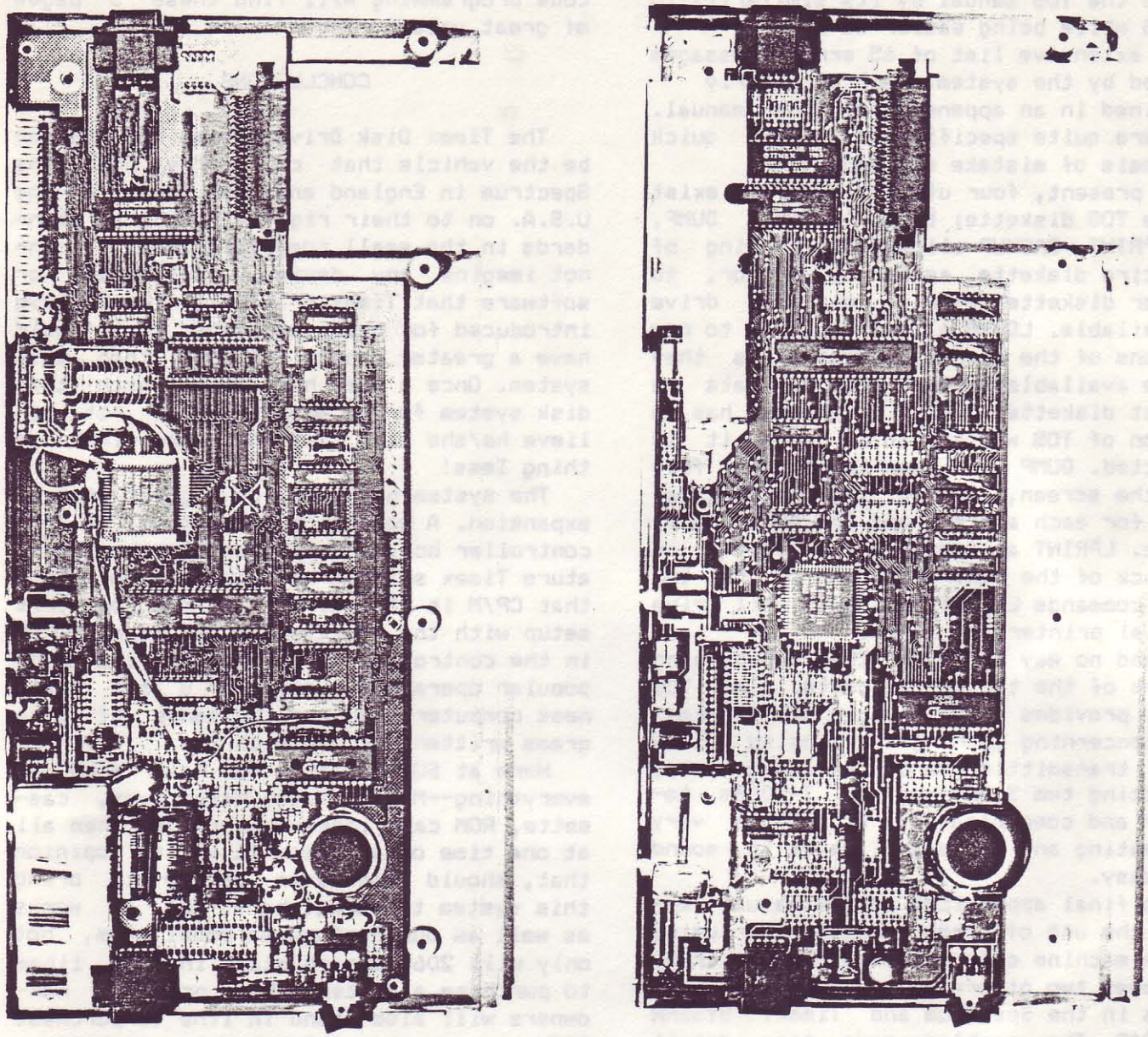
Here at SUM Magazine we have some of everything--Microdrives, Wafadrives, cassette, ROM cartridges--and we use them all at one time or another. It is my opinion that, should Timex ever decide to bring this system to market here, and it works as well as our Portuguese model does, not only will 2068 owners stand in long lines to purchase a system, but previous non-owners will also stand in line to purchase BOTH the computer AND the drive system!

-- Richard Cravy

Additional Notes on the Hardware of the T-2068 & Disk Drive

Disassembling the T-2068 reveals a circuit board smaller than found in the American computer. It is a very professionally designed board with no wire jumpers. A stand alone RF modulator replaces the video/RF modulator circuitry of the TS-2068. There are no trim pots or adjustable components except for a fine tune in the RF modulator. By comparison, the TS-2068 has five adjustable components.

The integrated chip count is down to 14 from 18 in the TS-2068, and none are socketed. Gone are the ICs which buffer the address and control lines; gone is the switching regulator IC, replaced by a 5 volt regulator and a very large heat sink as found in the Spectrum+. The speaker has a new chip driving it, the popular LM 386, and the sound is louder. The SCLD chip looks the same but following the circuit



Side-by-side comparison of the TS-2068 (left) and Portuguese T-2068 main circuit boards

board traces indicates that it is probably different--bad news for owners who might have wanted to swap theirs for this one.

The rest of the components on the computer circuit board are about the same and in the same general location with the exception of the 5 volt regulator and the Z-80 cpu. The ear and mic jacks are like those on the TS-1000 and Spectrum series; they are not as sturdy but work fine. The keyboard has more spring and fewer dead spots than the TS-2068. The circuit board itself is stamped "Timex 2068A"; compare this to my TS-2068 which says "Timex TS 2000". The boards seems to be one model behind the machines they are in!

The big question is how compatible is the new T-2068 with the English Spectrum and the American TJ-2068. The answer is: VERY! I was able to run M-Script with its 64 column mode as well as Musicola and Cyberzone and the computer ran like a TS-2068. Next I inserted the Spectrum Emulator cartridge that comes with the T-2068 and loaded all the Spectrum software I had. No problems! The emulator boots up differently than Doug Dewey's EMU 1. Doug's shows first the 2068 copyright and then switches to the Spectrum copyright. The T-2068 emulator boots directly to the Spectrum copyright notice.

What about hardware compatibility? The

In the middle is the Maxell 3" diskette. Other recording media include 5¼" diskette, ROM cartridge, Wafadrive cartridge, and regular cassette tape.

T-2068 has a Spectrum edge connector so should handle anything made for the Spectrum by using the emulator cartridge (Rotronics Wafadrive, Sinclair Interface I and II). The Timex 2040 printer works fine as does the 2050 modem and Tasman printer interface. The Aerco interface works fine on my printer, but may give problems since it looks for the RESET line, which is not in the same location on the T-2068 and Spectrum edge connectors. Since this line is for resetting your printer to begin printing, the same thing may be accomplished by simply turning off your printer and then back on before sending to it. The FootePrint interface described in SUM in the January thru March issues does well and so does the Timex 2020 tape recorder.

I believe the A & J Microdrive will work if a "twister board" is designed to make the edge connector look like the TS-2068.

In the May-June issue of LIST (Long Island Sinclair Timex Newsletter, P. O. Box 438, Centerport, NY 11721) Nazir Pashtoon also reviews the Portuguese T-2068. He has already figured out the rear edge connector pin-outs, specifically those which extend beyond the Spectrum (the T-2068 has more pins on its edge connector than the Spectrum, just like the TS-2068). EXROM, BE and RGB signals are still present on this new buss. Missing are ROSCS, SPKR TAPE OUT, SOUND, IOA5, and EAR. Added is a stripped sync signal for an RGB monitor making a direct hook-up to an RGB monitor possible. Connecting the proper pins to my Sears RGB monitor gave beautiful results without having to make any extra circuits. Pashtoon's unit apparently was a rough pre-production unit as it had a "rigged" color video circuit, extraneous bypass capacitors, and all its chips in sockets. Nazir did test the Sinclair microdrives on his model T-2068 and reported that they worked perfectly.

Opening all three of the system boxes shows clean, professionally designed and produced circuit boards. I only found one jumper wire.

The power supply is double-fused and well regulated. Our unit got a little hotter than I like, but did not affect its operation. It is necessary to always put it where it can get plenty or air circulation to prevent possible overheating.

Inside the disk controller I found a very familiar circuit board--the board from the TS-1016 RAM pack for the TS-1000! It still has the Sinclair logo and flat ribbon cable. The engineers were resourceful! The controller is basically a self-contained computer, having its own Z-80 cpu, memory (16k + 1k), and 1k ROM. For the two RS-232 ports on its backside, a UART (universal asycronous receiver/transmitter) is used. A disk controller chip and a "mystery" ULA chip completes the board.

Having the on-board RAM means the controller does not take up any computer RAM. This enhances software compatibility and distinguishes it from the Rotronics Wafadrive, Sinclair Microdrive, and several disk drive systems available in England for the Spectrum. A label on the bottom of the controller refers to CP/M. Since only the ROM was socketed inside, perhaps it will be changed and extra memory added for CP/M compatibility later.

Inside the disk drive box is a Hitachi 3" drive. The disk unit is very sturdy and solid looking; I suspect it will be very reliable. A set of jumpers at the back of the drive allows configuring the drive as number 1, 2, 3, or 4 in a system.

The two interfaces supplied with our unit allowed us to run the disk drive system with both the Spectrum+ and the T-2068. A third interface is promised to allow the TS-2068 to also run the drive system. We were able to accomplish this by using a twister board modified according to Nazir Pashtoon's instructions in LIST and then plugging into the T-2068 interface. Voila! Disk drives on the American TS-2068!

-- Joe Williamson

The Rotronics Wafadrive

An inexpensive alternative to cassettes

Those of us with ZX81s and TS1000s remember well the long and doubtful loading times of our original machines. To us, the TS2068 with its "fast" loading time was almost miraculous by comparison. But the new soon wore off, and we all cast our eyes longingly to Uncle Clive and the Sinclair Microdrives. Alas, they never got across the Atlantic before Timex bailed out.

In recent months we have at last begun to see our longings realized as microdrives, stringy floppies, and even disc drive systems have begun to make their appearance. This month we are going to look at the ROTRONICS WAFADRIVE SYSTEM. This system has been a big hit in England, where it was born, and is now available to 2068 owners with the aid of a Spectrum emulator.

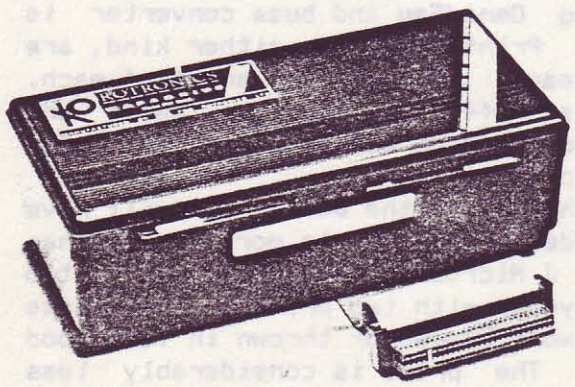
The Wafadrive is to be distinguished in name from the A & J Microdrive and the Sinclair Microdrive. The Wafadrive has been nominated by the British Microcomputing Awards committee for "Peripheral of the Year" and was named "Product of the Year" by the Computer Trades Association in England. Many reviews I have read place it above the Sinclair Microdrive in performance and reliability.

The Rotronics Wafadrive consists of a black plastic box about 9 1/4" wide by 4 1/4" deep by 3" high. It has a short interface cable and connector protruding from its front and three edge connectors visible in the rear. Two slots in the front near the top provide access to the wafadrives and three red LEDs between the two slots show power on and which drive is being accessed. The Wafadrive unit uses the same Entrepo stringy floppy tapes used by early A & J Model 2000 Microdrives (later models have a different drive and tape).

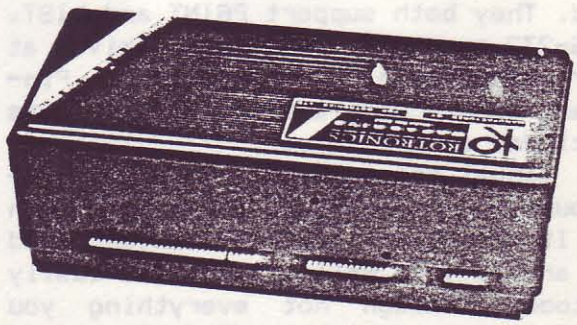
The Wafadrive plugs right in to a Spectrum or Spectrum Plus as it comes from the box. It can be interfaced to a TS 2068 using the Omni/Emu Spectrum Emulator (will not work with Romswitch or Spectrum Rom) and a Spectrum buss converter board. Connecting the system, at least to a Spectrum Plus, is very simple. Only the one connection to the back of the Spectrum edge connector is made. The Wafadrive draws its power from the Spectrum (or TS 2068) and needs no external power supply.

The back of the Wafadrive provides three outputs: a Spectrum compatible extension of the edge connector, a centronics parallel printer port, and an RS-232 serial port. Cables for the non-standard printer port connectors are available at a very reasonable price.

Once the Rotronics Wafadrive is connected and the computer is turned on, the regular opening screen shows the Sinclair



Front view of Rotronics Wafadrive. A Wafatape is inserted in the left drive.



Rear view of Wafadrive showing (l. to r.) edge connector, centronics port, and RS-232 port.

copyright notice. The computer functions like a normal Spectrum computer. To activate the Wafadrive Operating System, you type NEW *. After a very brief flicker of the screen, the screen shows that the operating system is in place. Now the fun begins.

CAT * #A (or B) will give a directory of the tape currently in drive A (or B) showing name of file, type of file, size of file, storage capacity of the wafatape, and storage space left.

To load a program, type LOAD * "a:filename" or simply LOAD *"" if the tape is in the default drive and has only one file on it. Saving is SAVE * "a:filename". The minimum size of a file is 1k so only 16 files maximum can be saved on the 16k tapes, and up to a maximum of 32 on the 64k and 128k tapes. Programs are transfered to or from tape at about 2k/second (18k baud) once the program is located by the Wafadrive. Maximum time to find a file is 45 seconds on the 128k wafers and 6.5 seconds on the 16k. The W.O.S. (Wafadrive Operating System) takes care of where to place the files and how many there are. Files do not have to be numbered as with the A & J drives.

New tapes must be formatted for use with the FORMAT * command. This is also useful for erasing a whole tape. Tapes can be protected from erasure by removing the write protect tab.

Other, more advanced work can be done with the file capabilities of the Wafadrive reminiscent of floppy disk systems. For example, random access data files can be written to and read off the wafatapes, and commands such as MERGE, MOVE, COPY, and VERIFY can be used.

The printer interfaces have their own software on built-in ROM so need no other software to work in Basic except the OPEN# command. They both support PRINT and LIST. The RS-232 can both send and receive at baud rates between 300 and 19,200. Pinouts and sample programming applications are included in the manual.

The manual consists of a 68 page wire-ring-bound book about 5" by 5 1/2" in size. It has both a Table of Contents and Index, and is very well written and easily understood. Though not everything you might ever need to know is found in it, I suspect that enough information is there for you to figure the rest out.

Also included with the Rotronics Wafadrive System is one blank wafatape and a word processing program called Spectral Writer. Spectral Writer resembles and functions very much like Tasword Two in many ways. It offers 64 character screen, 352 line text capacity, automatic word-wrap and justification, page numbering and headings, tabs, very fast text entry, "bell" before line ends, programmable printer codes, etc. It comes with its own 39 page manual also well written and organized. Its advantages over Tasword Two are these: it's "free" with the system, faster keyboard response, tabs, auto page numbering and heading, and ability to change screen colors. Its biggest disadvantage seems to be that there is no way given to change the 64 column line length. In other words, all lines of text must be 64 columns, no more or less! This makes it unsuitable (unless someone has the patch or knows an undocumented command) for producing anything with narrower columns such as this magazine article.

The Wafadrive Operating System commandeers 2k+ of your computer's memory when it is booted up with the NEW * command. It confiscates this memory just above the System Variables area and below the Basic Programming area. As a result, some programs may not fit when using Wafadrives. Other programs, because they address specific areas of memory also may not be compatible with the Wafadrives. We will be able to report more later on which popular software does and does not fit. Rotronics claims to have a list of software that has been converted to the Wafadrives.

The American distributor of the Rotronics Wafadrive System is Damco Enterprises, 67 Bradley Ct., Fall River, MA 02720; 617/678-2110. Their retail price for the system for the Spectrum is currently $165.95. Price for the TS 2068 version including Omni/Emu and buss converter is $229.95. Printer cables, either kind, are $12.95 each. Blank wafers are $3-4 each. They also offer a number of games and other software on Wafatapes at very reasonable prices.

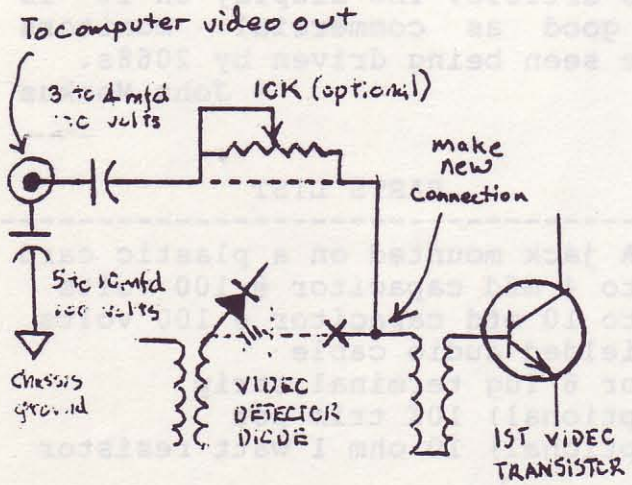
Are they worth the money? You will have to decide. For a little more money than the A & J Microdrive, you can get a two drive system with two printer interfaces and a word processor thrown in for good measure. The price is considerably less than the price of any of the single disk drive systems being advertised as of this writing. What would I do? I've already bought one! -- Richard Cravy

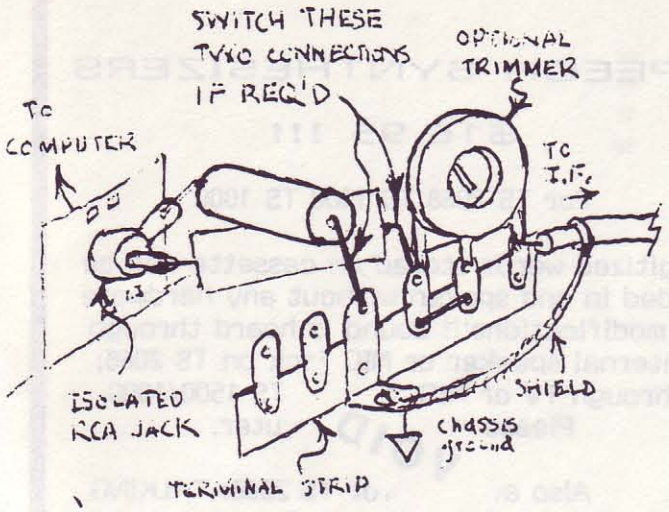
Hardware Project

Convert Your TV into a Computer Monitor

It's not too difficult to convert any B&W or recent color television into a direct-video monitor for your 2068. Being a T.V. technician by trade, I was not satisfied with the hashy-trashy display on my new computer since my old ZX-81 had a UHF RF modulator and put out a very clean picture. I found a 12" B&W transistor junker at the shop that only needed a fresh CRT , put in a tube from another abandoned set and converted it.

The most important fact about almost all T.V.'s today is that the CHASSIS GROUND IS NOT EARTH GROUND. In order to eliminate the necessity of an expensive power transformer, the chassis ground is A.C. ground and can have up to 117 volts A.C. potential to earth ground. This means we have to use capacitors for both ground and to couple video into the set. I found that 10 mfd was more than enough to eliminate any tearing in the video due to the lack of a real ground. Use 3 or 4 mfd. for the signal capacitor. I modified my set into a monitor only, but it is possible to add a switch to cut off one of the I.F. transistors and make a TV/monitor.





Start out by using a schematic or other means and find the video detector diode and the first video transistor. The monitor output of your computer is injected after the video detector and before the first video amp. Mount an RCA jack installed in a plastic card next to a place where you can cut a hole in the cabinet . A cardboard template that fits over one of the controls that projects out of the back makes locating the hole in the cabinet easy. Mount a terminal strip near the jack and run the two capacitors between it and the jack. Connect one between chassis ground and the outside of the RCA jack. Connect the other capacitor between the center of the jack and the center of the shielded cable. Run the shielded cable into the I.F. and solder the center in the hole left after you have pulled up an end of the video detector diode. After you make certain that both parts of the jack are isolated, it's time to switch your computer's cable from RF to the monitor jack and hook up the set and see clean direct video. Now, if the picture is negative and flipping,the fix is easy. Your set has negative video so just switch the connections of the coupling capacitors. If the signal seems to be too strong or there are double images; adding a 10K ohm trim pot should take care of it. On a color TV you can re-center the tint by using the proper adjusting tool on the burst transformer. If you're adjusting this transformer, then the slightest adjustment makes a huge difference in the tint. If the color is weak,the ACC/Killer trim pot will take care of that. I found that it's also good to disconnect the speaker and replace it with a 10 ohm 1 watt dummy load.

This conversion works for both B&W or color sets. I'm using the 12" set I modified right now to write this article. The display on it is as good as commercial monitors I've seen being driven by 2068s.

- John Monkus

PARTS LIST

RCA jack mounted on a plastic card
3 to 4 mfd capacitor @ 100 volts
5 to 10 mfd capacitor @ 100 volts
shielded audio cable
5 or 6 lug terminal strip
(optional) 10K trim pot
(optional) 10 ohm 1 watt resistor

Software Review/Evaluation

Pro/File 2068 Filing System
An Outstanding Value

When Tom Woods released PRO/FILE 2068 so long ago, it appeared to be quite a file system if you could figure out how to use all of it's features from the meager instructions included with the program. We were all promised that a comprehensive manual was being compiled and would be shipped to all who ordered P/F as soon as it was available. So we waited, and we waited. Finally, after almost a year had gone by, it came! - it was worth the wait!

The program itself was a sleeping giant waiting for someone to master it's power and complexities. The manual is an in-depth tutorial on its use, enhancements, and disassembly.

The manual describes the program as being like an "index card" file system with each screen of data (record or file) being a single card. Once the data is put in each record, you can order them alphabetically or numerically and call up any record of your choice just by entering the name in that record - as with the card file. P/F goes it one better by being able to pull up a record by any piece of information in that record.

For example: Suppose you have a mailing list with names and addresses and you want to bring up a record that had the word "NEW" in it but you can't remember where the word appeared in the address. You can simply enter the word "NEW" and P/F will go and look for any occurance of the word "NEW" and display it on the screen. It may bring it up as being in the name: I. NEWTON, or in the address: 112 VINEWOOD AVENUE, or in the city/state line such as: NEW YORK, NY 10009. I must note here that it is better to stay in caps mode so that there will be no mistake between "new", "New", and "NEW". P/F sees these all as different words.

The records are pulled up lightning fast, and once pulled up, you can change them, print them, or call up the next record with the same search command. Search commands can also be mixed so that you can ask for more than one parameter to be true before a record is displayed by separating each search command by the token "AND". In the previous example, suppose that we want to display all people living on "VINEWOOD" and also living in "NEW YORK". We would enter "VINEWOOD AND NEW YORK" in response to the SEARCH COMMAND? "C" prompt.

The main menu displays several parameters such as the number of bytes open (starts with 28000), the file name, the line in which ordering takes place, and the printer format (which lines are sent to the printer and in what order). The bottom of the screen contains the menu: Type "A"to add files, SAVE or LOAD for SAVEing and LOADing of files, AUTO for ordering the files and DEFP which allows you to alter the printer format.

Choosing "A" gives a blank screen with a blinking cursor in the top left corner and a sub-menu at the bottom. You can now enter anything you like in the 15 line by 32 column space provided. The arrow keys allow you to start anywhere you like and the sub-menu gives you commands to delete and insert lines and COPY to your printer. Also, you can edit existing files from this menu. You must remember to place the

same type of information on the same line in each record so that the order command can always order the correct data.

Once you enter a file, you will notice there are spaces between the end of your data and the end of your line. Most databases would see these spaces as data and save it as part of the file along with the rest of the data in that file. That wastes a lot of valuable space. In P/F, those extra spaces are ignored. This of course allows much more data to be saved as compared to say, VU-FILE.

The manual goes into great detail on each function available and numerous examples are given to help you understand what is going on. The manual even explains how the program works in a step by step analysis of both the BASIC and machine code programming. Also included are numerous enhancements to make the program more useful.

Enhancements include: Saving a back up copy, adding verification, how to change a file name, how to clear your files, adding an audible tick to your keystrokes, saving paper by not LPRINTing blank lines, ordering by more (or less) than the first five characters, disable auto-repeat in add/edit mode, go directly to LPRINT from the edit mode without going through the main menu, go from edit to next entry without going to the the main menu, Autosearch improvement, block delete to purge specified files, and block sort to rearrange data.

Personally, I would have liked to have seen all these improvements included with the original, but I can understand how all these improvements would take away from the storage capabilities of 28000 bytes (or characters). A definite must for me are the "Go from edit to next entry without going to the main menu" and the "Autosearch improvement" enhancements.

Use c⁽ a "big" printer requires that you enter the code for your interface. Included is code for the Aerco, Tasman, and all Byte-Back interfaces. Also included is a "TALLY" routine which allows you to perform math functions and tabulation on data stored in files.

The only drawback that I could find is the speed at which it orders. As fast as the program finds things, I had hoped that the ordering would be at least as fast. With about 400 names and addresses in each file, it took about 30 minutes to order by Zip Code and print out. Otherwise, I was very impressed with the friendliness of the program, its storage capabilities, and the way it handles files. Of course there are always improvements that you would like to add, and the manual's explanation greatly aids you in any such endeavor.

We had considered finding a new program to handle our SUM mailing list which would store more names and addresses. The data we had was stored in A$ in a matrix format (200,25,5) and P/F uses d$(28000). From the manual, I was able to determine that each file in P/F was separated by an asterisk, and each line was separated by a character code 1. With a short little program, I was able to convert my data over to d$ and load it into P/F. You must make sure that d$ is the first variable to be dimensioned. I now have all of our list

on P/F and love it! We needed something along these lines to help update our mailing list and to order by zip code, which is required for bulk mailing.

We needed a few enhancements of our own to make it fit our needs a little closer. The first thing I added was the go from "edit" to next entry without going to the main menu and the autosearch improvement given in the manual. I found that it didn't work just right so I added or changed the following lines:

```
5015 LET Y$=INKEY$
5016 IF Y$=" STOP " OR Y$=" STEP
 " THEN  ON ERR  RESET : GO TO 6
000
5020 FLASH 0: PRINT AT 1,c;SCREE
N$ (1,c):BEEP .0003,34: IF CODE
y$<16 THEN  GO TO 5100+CODE y$
```

Note the BEEP command in the above line. This works much better than the enhancement given in the manual. Also, remove the FOR-NEXT loop at the end of line 5030. I don't know why its there, but it slows things down a bit. I also added the go directly to LPRINT enhancement. One of my own enhancements is the go from ADD a file to ADD another file without going to the main menu". To do this, add or change the following lines:

```
   1 LET j=0
  15 IF j=1 THEN GO TO 5000
5016 IF Y$=" STOP " OR Y$="NOT "
 OR Y$=" STEP " THEN  ON ERR  RE
SET : GO TO 6000
6025 IF Y$="NOT " THEN  LET J=1
```

When you are through adding one file and wish to add another, enter the token: "NOT " and you are immediately given a new file to fill instead of going through the main menu first. This really saves time when you are adding a lot of new names to a mailing list.

For our application, we need to have only current subscribers print out on our mailing labels. To do this, I use the sixth line in the file as the date line which holds the expiration date of each subscription. 8512 means that December of this year is the last issue that will be received. To incorporate this into P/F, we need the current month and year to be entered and compared to the current file to be printed. Also, printer code must be entered to use a large printer. The following lines were added or changed:

```
   1 LET j=0: POKE 26703,187: PO
ke 26704,248: INPUT "Enter today
's date (yymm): "m$
   2 POKE 23658,8
7206 IF E$(4,1)<>X$(1) THEN  GO
TO 7208
7207 IF E$(4,1 TO 3)=X$ THEN  GO
 TO 7210
7208 IF E$(6,1)=" " THEN  GO TO
7230
7209 IF VAL E$(6,1 TO 4)<VAL M$
THEN  GO TO 7230
```

When ordering of the zip codes is called, the program now checks to make sure that each name is up to date before it is printed. We now have a very usable program with enough power and storage to handle us no matter how big we get!

PRO/FILE 2068 is available from Thomas Woods, P. O. Box 64, Jeffersn, NH 03583; 603/586-7734. Price is $29.95 + shipping. Phone orders are accepted with credit card.

-- Joe Williamson

2068 Graphics for the Beginner

Having purchased a 2068 computer, I soon found that I would have to know at least a basic knowledge of trigonometry if I were going to make graphics to any degree. Not having a working knowledge of trigonometry, nor a desire to go back to night school to obtain it, I decided to obtain a book on basic trigonometry and try and learn it myself.

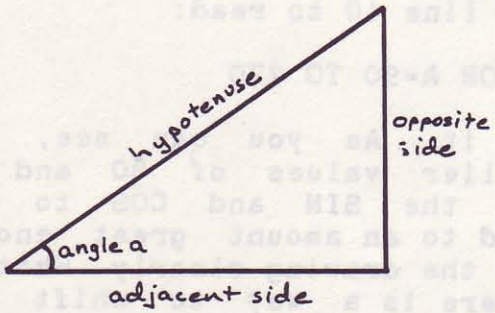
Having the book, and the computer, and the desire to learn, the next logical step was to use the computer to help me learn. The results of this endeavor are given in this article. The article is for others, who like myself, desire to learn.

The Trigonometry: Trigonometric functions are based on a circle of 360°. There are three basic functions:

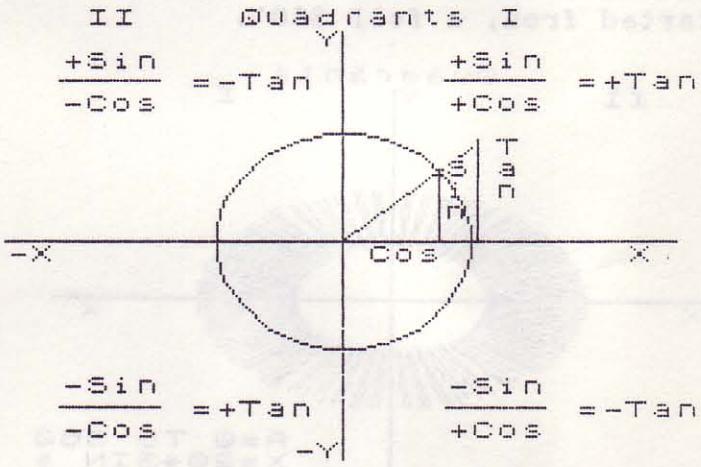
$$\text{SIN } a = \frac{\text{Side opposite}}{\text{Hypotenuse}}$$

$$\text{COSINE } a = \frac{\text{Side adjacent}}{\text{Hypotenuse}}$$

$$\text{TANGENT } a = \frac{\text{Side opposite}}{\text{Side adjacent}}$$



Simply stated, these are the ratios of one side to another with respect to the given angle, a. How do these affect us when doing graphics? Inside the computer there is a number system used to tell the computer where to plot and draw the lines. These locations are found by using the numbers along with a grid system with an X and Y axis. An aid for remembering the direction in which these lines run is: Why (Y) up and down when (X) across? The Y axis runs from the bottom to the top and the X axis runs from left to right on the screen. A third axis is called the Z axis. It runs into the screen in a line of sight fashion. The point where these lines cross is called the origin or vertex. The Z axis is used for three dimensional graphics.



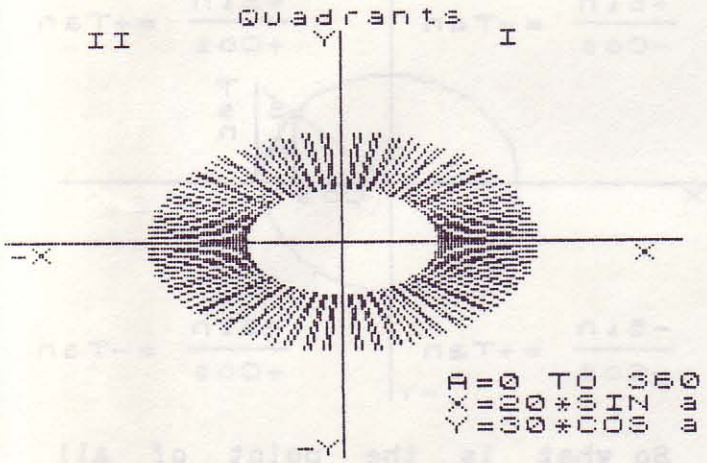
So what is the point of all this? Bear with us a little longer and you will start to see what this is all about. We now introduce some more terms.

The number 3.14159 is known as PI (pie). The RADIAN comes from 180°/PI. This gives us 57.3°. Going a step further we have PI/180°. This is .01745. That is to say, there is .01745 of a radian in 1°. Your 2068 uses this system when calculating parts of a circle.

Dividing 360° by 57.3° we get 6.28, or 2PI. There are two pi radians in 360°, which is a circle. The circumference of a circle is found by: C=2*PI*r where r is the radius of the circle. Again it is a

ratio. The circumference is 2*PI times longer than the radius. The ratio of the circumference to the diameter is PI. Wow, did we need all that? Aren't you glad this is not a trig. class?

Let us go back to the radius for a minute. If we extend a line outward from the vertex on the X axis, say to the right side, and then we begin to rotate this line counter-clockwise, Each time the line moves through a 90° section of the circle, it is passing through what is called a quadrant. The first 90° is the first quadrant. As it rotates into the next 90° (on its way to 180°) it is entering the second quadrant. When it has passed through the third and fourth quadrant, it is back to where it started from, a full 360°.



Now type the program into your computer and RUN. When the menu appears on the screen, enter 1. This will bring up the graph with the trig. functions on it. Notice that the signs of the trig functions change as the line is rotated through the quadrants. This is the effect of the line as it passes through the quadrants. This must be taken into account when designing graphics. If you ignore the sign changes, you would have a line going in the wrong direction at the wrong time!

After saving the main program, Enter this program into the computer:

```
 5 FOR A=0 TO 360 STEP 3
10 LET X=SIN(A*PI/180)
15 LET Y=COS(A*PI/180)
20 PLOT 128,99:DRAW X,Y
25 NEXT A
```

Did you run it? if so, you saw what looked like a small square on the screen. Why was it so small? To see why, we will pick a number out of the 0° TO 360°, say 30°. The SIN of 30° is 0.5. Taking the COS of 30°, we get 0.866. Neither one of these numbers are very large and they have not traveled very far, only 30°. Also they have not moved very far from the vertex. Then we have another factor to consider, that of the step value 3. Therefore, our line is drawn only once every 3°. If you happen to know the SIN or the COS value of a number, you can find the angle by reversing the trig. function on a calculator.

What we need is a way to magnify the drawing so that we can view it easier. How do we do this? Change line 10 and 15 to read:

```
10 LET X=30*SIN(A*PI/180)
15 LET Y=15*COS(A*PI/180)
```

Now run it. How about that? A fancy arc! This is what we thought was a square before. How would you draw a circle without using the circle command? Now what if you want to draw in just the first quadrant? Back to the magic A. Change line 10 to read:

```
5 FOR A=90 TO 270
```

Try it. As you can see, the multiplier values of 30 and 15 caused the SIN and COS to be shifted to an amount great enough to see the drawing clearly. What we have here is a way to shift the size of the drawing up or down in size. Now that we know how to do that, how do we shift the drawing on its axis, that is tilt it?

If you have followed closely what has been covered so far, you will have noticed that the SIN and

COS are also a ratio to each other. As one is affected, so is the other. That is as long as they share the same variable.

Remember the quadrants and the rotating line? Load the main program again and bring up the graph. Study the graph until you understand how these functions work. Watch the sign changes!

Now load the next program and watch what happens to the figure:

```
  5 PLOT 0,88:DRAW 255,0:PLOT 1
28,0:DRAW 0,175
 10 FOR A=0 TO 360 STEP 5
 15 LET X=25*SIN (A*PI/180)
 20 LET Y=75*COS (A*PI/180)
 25 PLOT 129,88:DRAW X,Y
 30 NEXT A
```

When you run the program you will see that the figure appears to have turned on its axis. We told the computer to increase the COS value by an amount in which the ratio of the SIN to the COS makes it look like it turned. We have the trigonometry working for us in much the same way an artist does his pencil, with the screen being the paper.

We have learned how to magnify our views by simply changing the value of the SIN and COS by using a multiplier. By changing the value of the variable, we were able to start the drawing at a different quadrant. Try various combinations of functions.

Just think of the advanced graphic capabilities in this machine which we haven't even covered here. There will be very little that you will not be able to do with it.

We need to mention the third function, the tangent. On the graph of the main program is a line running perpendicular to the X axis and at the outer edge of the circumference, this is the tangent. To see an affect of the tangent, change line 15 to read:

```
 15 LET X=25*SIN (A*PI/180)*TAN
A/10
```

You can create some unusual designs using this function as well. Type in the following:

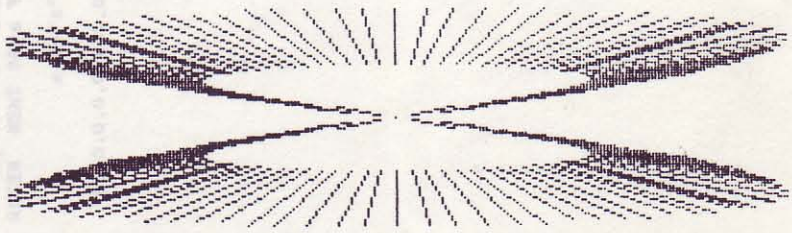
```
  5 PLOT 0,88: DRAW 255,0: PLOT
128,0: DRAW 0,175
 10 FOR A=0 TO 360 STEP 5
 15 LET X=25*SIN (A*PI/180)
 20 LET Y=-COS (A*PI/180)*2
 25 LET Z=10*TAN (A*PI/3)
 30 PLOT 129,88: DRAW X,Y
 35 PLOT 50,88: DRAW X,Y,Z
 40 NEXT A
```

Now try taking some of the examples we have given and use your imagination to see what you might do with them. Try removing the DRAW statements and leaving just the plots. Change values, sign, etc. You be the artist.

We have tried to present some of the things that we have learned along the way. It is hoped that others will be encouraged to experiment on their own. There are unlimited possibilities with this machine. The graphics are all there, all you have to do is get them out.

You might get a book on trigonometry and learn more about it. It can be a lot of fun trying to draw these graphics. (Ed's note: Some of the best designs I came up with was in the "Dividing PI by Degrees" section which starts at line 500. Try using 245 & 90, 245 & 45, and 120 & 240. To watch the graph build even more, change the 360 in line 510 to something alot higher like 720.)

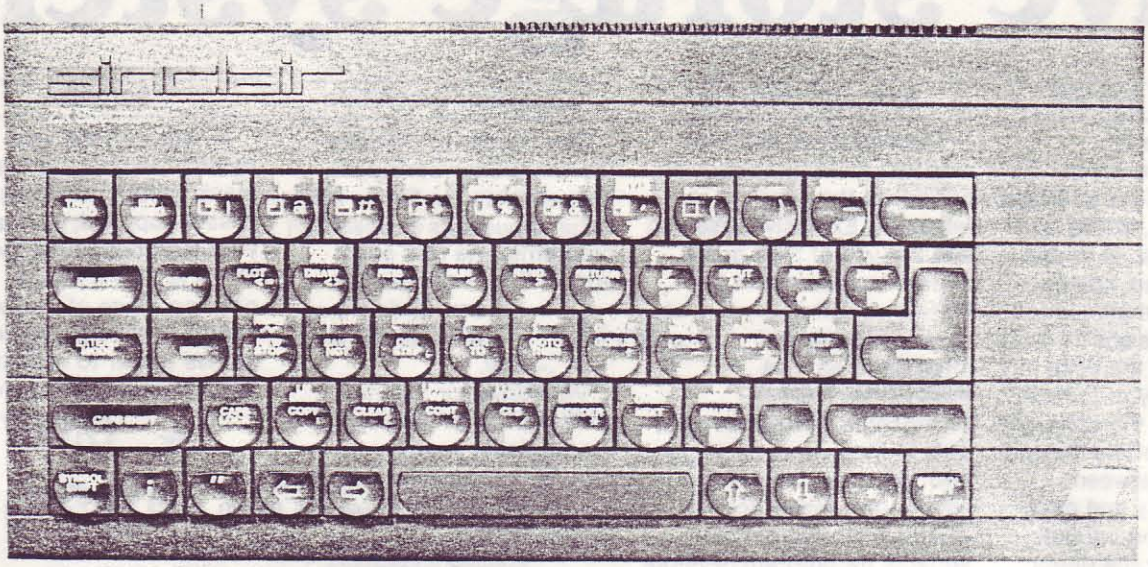
Andy Centek Jr.
Garden City, MI



(The master program listing is found beginning on page 12)

```
  5 REM ** Graphics and trig **

 10 PAPER 0: INK 7: BORDER 5
 11 GO SUB 200
 12 GO SUB 1000
 14 PRINT AT 2,5;"Trig. affects
 on graphics ."
 15 PRINT "Showing plots of tri
g functions  in relation to qua
rdrants,"
 20 CLS
 22 PRINT "1-Graph with trig. f
unctions labled on graph."
 23 PRINT
 24 PRINT "2-Sample program ."
 25 PRINT
 26 PRINT "3-Run a program ."
 27 PRINT
 29 PRINT
 31 INPUT n
 32 IF n=1 THEN  GO TO 40
 33 IF n=2 THEN  GO SUB 300
 35 IF n=3 THEN  GO TO 399
 36 GO TO 399
 39 STOP
 40 CLS
 44 PLOT 0,88: DRAW 255,0
 45 PLOT 128,0: DRAW 0,166
 50 PRINT AT 0,12;"Quadrants"
 55 PRINT AT 0,6;"II";AT 0,22;"
I";AT 21,6;"III";AT 21,22;"IV"
 57 PRINT AT 2,5;"+Sin";AT 3,5;
"3 UDG a's";AT 4,5;"-Cos";AT 3,
10;"=-Tan"
 58 PRINT AT 2,20;"+Sin";AT 3,2
0;"3 UDG a's";AT 3,25;"=+Tan";A
T 4,20;"+Cos"
 59 PRINT AT 17,5;"-Sin";AT 18,
5;"3 UDG a's";AT 18,10;"=+Tan";
AT 19,5;"-Cos"
 60 PRINT AT 17,20;"-Sin";AT 18
,20;"3 UDG a's";AT 18,25;"=-Tan
";AT 19,20;"+Cos"
 61 PRINT AT 20,14;"-Y"
 62 PRINT AT 11,0;"-X";AT 11,30
;"X"
 63 PRINT AT 1,15;"Y"
 64 PLOT 128,88: DRAW 40,35: PL
OT 128,88: DRAW 30,0: DRAW 0,27

 65 PRINT AT 7,20;"S";AT 8,20;"
i";AT 9,20;"n"
 66 PLOT 128,88: DRAW 42,0: DRA
W 0,38
 67 PRINT AT 6,22;"T";AT 7,22;"
a";AT 8,22;"n"
 68 PRINT AT 11,17;"Cos"
 69 CIRCLE 128,88,40
 70  BEEP .01,.1: BEEP .05,.1

 97 INPUT "Enter -m- (return to
 Menu only)";a$
 98 IF a$<>"m" THEN  GO TO 97
100 GO TO 20
200 FOR i=0 TO 7
201 PRINT AT 0,4;"Coming Up --G
RAPHICS"
202 PRINT  INVERSE 1;AT 19,0;"
 I AM COMPUTING-PLEASE WAIT !
"
205 BRIGHT 1: PAPER 1: INK 7: B
ORDER 0
210 FOR n=0 TO 40
215 FOR a=0 TO 65
220 NEXT i
225 LET r=2-(a*SIN (n/3*PI))
230 LET c=10-(a*COS (n/6*PI))
235 PLOT 120,90: DRAW r,c
240 NEXT n
245 NEXT a
247 FOR x=10 TO 0 STEP -1: BEEP
.01,x: PAUSE 5: NEXT x
250 PRINT  INVERSE 1;AT 19,0;"
      Andy Centek,Jr.
"
265 PRINT AT 1,5;"*";AT 5,3;"*"
;AT 10,25;"*";AT 20,7;"*"
280 PAUSE 300: CLS : RETURN
299 STOP
300 REM ***  Draw Graph ***
305 CLS
310 PLOT 0,88: DRAW 255,0
315 PLOT 128,0: DRAW 0,166
320 PRINT AT 0,12;"Quadrants"
325 PRINT AT 1,6;"II";AT 1 ,22;
"I";AT 21,6;"III";AT 21,22;"IV"

330 PRINT AT 20,14;"-Y";AT 11,0
;"-X";AT 11,30;"X"
335 PRINT AT 1,15;"Y"
339 PAUSE 100
340 FOR a=0 TO 360 STEP 3
342 BEEP .005,.005
345 LET x=30*SIN (a*PI/180)
350 LET y=20*COS (a*PI/180)
355 PLOT 128+x,88+y: DRAW x,y
356 PRINT AT 17,20;"A=0 TO 360"
;AT 18,20;"X=20*SIN a";AT 19,20
;"Y=30*COS a"
360 NEXT a
365 INPUT "Return to Menu only.
Enter -m-.";q$
370 IF q$="m" THEN  GO TO 20
375 IF q$<>"m" THEN  GO TO 365
398 STOP
399 CLS
400 REM ** Main Program **
401 PRINT  "Showing the effects
 of the      multipliers of the
 Sin and Cos."

402 PAUSE 150
403 INPUT "Chose multipliers. O
ne number","for the SIN (1-35)a
nd one for    the COS.(1 TO 30)"
;s,c
404 PAPER 1: INK 7: BORDER 5
405 CLS
406 GO TO 460
410 FOR a=0 TO 360 STEP 3
420 LET y=s*SIN (a*PI/180)
430 LET x=c*COS (a*PI/180)
435 PLOT 128+x,88+y: DRAW x,y
436 IF a>=360 THEN  GO TO 456
455 NEXT a
456 INPUT "Another or a new pro
gram (a or n) ?";q$
457 IF q$="a" THEN  CLS : GO TO
 400
458 IF q$="n" THEN  GO TO 500
459 IF q$<>"a" OR q$<>"n" THEN
GO TO 456
460 REM ** Draw Graph **
461 CLS
462 BEEP .05,.05
465 PLOT 0,88: DRAW 255,0
470 PLOT 128,0: DRAW 0,166
475 PRINT AT 0,12;"Quadrants"
480 PRINT AT 1,6;"II";AT 1,22;"
I";AT 21,6;"III";AT 21,22;"IV"
485 PRINT AT 20,14;"-Y";AT 11,0
;"-X";AT 11,30;"X"
490 PRINT AT 1,15;"Y"
492 PRINT AT 18,2;s;"*Sin";AT 1
9,2;c;"*Cos"
495 GO TO 410
500 REM ** Dividing PI by degre
es **
505 CLS
507 INPUT "Dividing PI by degre
es (0 to 360 ).Input degees for
 SIN and COS (1-2) ?";d1,d2
508 BEEP .05,.05: BEEP .05,.05
510 FOR a=0 TO 360 STEP 3
525 LET x=60*SIN (a*PI/d1)
530 LET y=40*COS (a*PI/d2)
535 PLOT 128+x,88+y: DRAW x,y
545 NEXT a
550 INPUT "Run another or next
program ? (a or n)";q$
556 IF q$="a" THEN  GO TO 500
560 IF q$="n" THEN  GO TO 600
600 CLS
605 REM ** Plot over function *
*
606 PRINT AT 2,2;"Using the dra
w over function ."
610:  INPUT "Values for SIN and
 COS .Mx. SIN value 120. Mx. CO
S value 80.(1-2) ?";s,c
611 IF s>120 OR c>80 THEN  FLAS
H 1: PRINT "To Big": PAUSE 100:
 FLASH 0: GO TO 610
612 CLS
613 PRINT AT 19,3;s;"*SIN ";AT
20,3;c;"*COS "
615 FOR a=0 TO 360 STEP 8
620 LET x=s*SIN (a*PI/180)
625 LET y=c*COS (a*PI/180)
630 PLOT 128,88: DRAW  OVER 1;x
,y
632 POKE 23692,5
635 NEXT a
636 PRINT  INVERSE 1;AT 18,0;"
You may change the step value
at line 615  for different
    affects.Press any key to
    continue.
    "
637  PAUSE 0:
640 INPUT "Another or back to m
enu (a or m)? ";q$
645 IF q$="a" THEN  GO TO 610
655 IF q$="m" THEN  GO TO 20
660 SAVE "trig" LINE 5
1000 REM     GET LINE USR A
1002 FOR n=0 TO 8
1004 READ a: IF a=99 THEN  RETUR
N
1006 POKE USR "a"+n,a
1008 NEXT n
1010 DATA 0,0,0,255,0,0,0,0,99
```

A Review of the Sinclair Spectrum Plus



The latest home computer from Sinclair is the ZX Spectrum+. What sets this computer ahead of the other Spectrums is the larger keyboard with extra dedicated keys. The Spectrum+ looks a lot like the QL small business computer but with a few less keys and no microdrives attached to the side.

The keyboard itself has more of the feel of a "large" keyboard, more so than the 2068 does. Pull-out legs are also provided in the rear to prop up the keyboard at an angle for more comfortable use. A reset button is located on the left side to get out of any crash situation or to start all over.

Dedicated keys include the arrow keys, the period and comma, quotation mark, semicolon, true and inverse video, single key extended mode, caps lock, graphics, edit, delete, break and an extra symbol shift key on the left side. One thing that annoyed me was the placement of the break key which is just to the right of the zero key. Most computers have the delete or backspace key there. Why change it?

The connections on the back are in the same locations as on previous Spectrums. In fact, the circuit board inside is the same as well, so that Spectrum owners can now buy upgrade kits to fit old Spectrums into this new case. To carry this a little farther, you could even fit the TS 1500 circuit board inside this case and it would work as well, even with the keyboard! Of course the key words don't all line up, but the alphanumerics are all correct.

On the circuit board itself, none of the integrated chips are socketed except for one of the two ULA chips. Suprisingly, there are more IC chips than in the 2068, on a much smaller board.

When you get one of these things, you need to supply your own power supply. The power supply that came with the TS-1000 and 1500 works nice as long as you either change the plug at the end of the cord to a coaxial type as found on the 2068 with center negative, or you can mount a new socket in the computer itself to match the plug that already exists on the power supply cord. If you don't have a power supply sitting around, any of the replacement Atari game power supplies work just fine on this or any of the ZX 81/TS-1000 or TS-1500s.

Because the Spectrum is designed to work on the PAL type TV system, you need to supply your own RF cable to connect to a TV with a UHF tuner. The channel for viewing is around 36; be prepared to adjust the vertical hold on your set. My Spectrum gives me a very good picture with

little to no interference (squiggly lines, grid pattern).

There is no monitor jack on the rear of the computer, but one can easily be added. I used a chassis-mount RCA type connector and drilled a hole next to the RF jack so that the new jack will fill in the space between the modulator and the rear leg assembly. Connect the center pin to the nearest wire leading into the modulator (goes into the side center of the modulator). The outer ring goes to the case of the modulator. This alone gives a good picture on most monitors. To get a little brighter, sharper picture, locate the 2.2K (red, red, red) ohm resistor which is second from the rear in a row of twelve resistors just in front of the left side of the modulator and jump a 4.7K (yellow, violet, red) ohm resistor across it. If you get any tearing of the picture, use a higher value resistor.

Color is another story. Probably the biggest difference between the TV standard used here (NTSC) and the one used there (PAL) is the way color is added to the picture. The simplest way around it (if you need color) is to buy an RGB interface for the Spectrum and use it with an RGB monitor. The poor man's way is to change out the color burst crystal. The computer comes with a 4.43 MHZ crystal which is the frequency used in the PAL TV system. With NTSC, the frequency is 3.579545 MHZ, so run down to your local electronics parts store and pick one up (Radio Shack sells them for around $1) and swap crystals out.

Doing this, I get a beautiful blue and yellow, but other colors are just so-so. On older Spectrums, all you needed to do was change out the resistor and capacitor values in the color circuit to match what is used in the 2068. Unfortunately, this new version of the Spectrum marked issue 6A uses a different video processor (SN94459) and I have yet to get a schematic for it, so we'll have to live with the colors the way they are for now.

The second crystal can be changed out to provide a more stable picture. This crystal is 14MHZ, whereas the 2068 uses a 14.112MHZ crystal. Good luck finding this

other crystal unless you happen to have a junker 2068 laying around to pull parts from.

I enjoy using this new Spectrum - particularly the keyboard. All Spectrum software runs on it with no problem, giving you access to over 5,000 programs. Even now, Spectrums are one of the leading home computers in England, giving Commodore, Atari, and others fierce competition. The Spectrum+ is available now through English Micro Connection in Newport, Rhode Island.

--Joe Williamson

Additional Notes on the Spectrum Plus

While Joe was busy checking out the "mechanics" of the Spectrum Plus, I was looking it over in other ways.

First, the Spectrum Plus comes with an excellent manual printed in full color. Only 80 pages counting the index, the User Guide does not cover as much as the 2068 manual does (no sound synthesizer to talk about or hi-res graphics) but is packed with info in a smaller print done double column with color screen shots and boxes containing additional information. I found it much more interesting and enjoyable than the 2068 manual but cannot evaluate how a computer novice might receive it. Many short but colorful graphics programming examples are included which should quickly build confidence in a new user and impress him that the purchase of this particular computer was a good one. Two additional books are advertised inside the back cover, entitled "Step By Step Programming" Parts I & II. They are done by the same company that produced the User Manual for Sinclair and follow the same style and format.

Also accompanying the Spectrum Plus is a cassette tape containing a ZX Spectrum Plus Keyboard Tutor on Side A and a useful user-defined graphics generator and a game (which is actually very good and uses udg's) on the back side.

Using the computer keyboard is a mixed bag. Certainly the keys are a big improvement over the original Spectrum keyboard (practically identical to the TS-1500). The keys feel wobbly when you push them since they are resting on a rubber sheet with "bubbles", but make at least as good a contact as the 2068 keys do. The extra keys on the keyboard are very welcome: dedicated arrow keys, extended mode key, and quote, edit, delete, graphics, period and comma keys. On the other hand, this keyboard suffers the same problem as the 2068 in placing your right little finger on the ENTER key when in normal position. This is one less key than standard typewriter keyboards and is still distracting to me even after 1 1/2 years of use. Making the problem of key placement more obvious is the space bar, which is only 2/3 as long as that on the 2068. As a result, a more concentrated effort has to be made to strike the space bar each time it is used--and it is the most used key in word processing. Since arrow keys are placed on either side, each missed stab results in either moving up a line or over a space! On this keyboard the BREAK key has been placed where we are used to finding the DELETE key, a real no-no. Overall, the keyboard rates about 60/40--the available dedicated keys slightly outweighing the inconvenience of the space bar and BREAK.

The Spectrum Plus key surface is 1/2" taller than the 2068's and is flat, not gently sloped as on the American machine. In order to introduce some angle, two legs at the rear of the computer can be extended to raise the rear a further 1"--there is no intermediate position. I found both positions, flat or angled, uncomfortable, and felt that the height of the whole keyboard is too high. Those who are not touch typists and who do not do extensive word processing probably will not notice.

All the above makes it sound like the Spectrum Plus is a loser. Not so! The computer looks very elegant sitting on a desk in its all-black case and hi-tech keyboard. Loading programs can be heard thru the speaker and this computer is 100% compatible with ALL Spectrum software and hardware, includng the microdrives and new Portuguese disk drive.

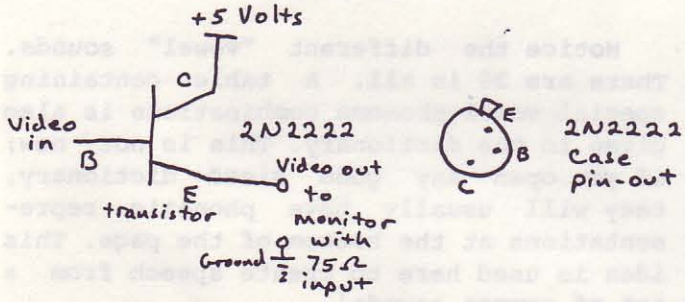
For those who want the ultimate in Spectrum compatibility, or are looking to replace an ailing 2068 or move up from the TS-1000 series, this may well be the answer. Most hardware and software made just for the 2068 won't work on it, and some attention will need to be given to those areas covered by Joe, particularly a monitor output, since this would allow color output without crystal swaps.

-- Richard Cravy

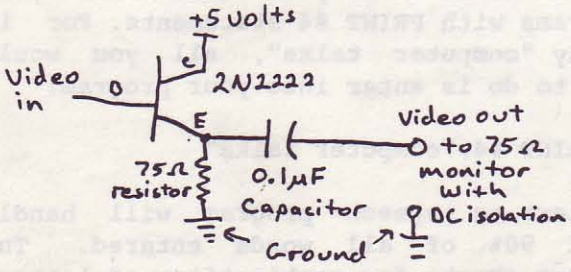
Monitor Output for the TS-1000 & 1500

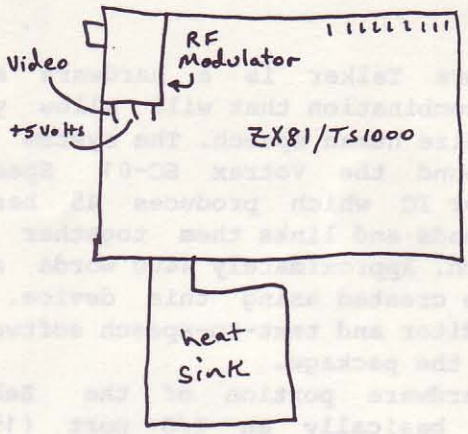
I have had numerous requests on how to add direct video to the TS-1000 & TS-1500 computers so as to drive a composite video monitor. This has been covered many times in the past in other newsletters and magazines, but I feel that for those who are just now starting to use their computers and those who missed the other articles, here is how to do it.

The only way to do it is to go inside the computer and make some extra connections and add extra circuitry. On the two monitors that I have, one works quite well from just tapping the video signal before it goes into the modulator and connect it directly to the monitor (don't forget the ground). This method will work on almost all monitors that have a switchable input impedance -- labeled Hi-Z and 75 ohm. If you connect the video from the computer directly to the input of the monitor, you should use the Hi-Z position.

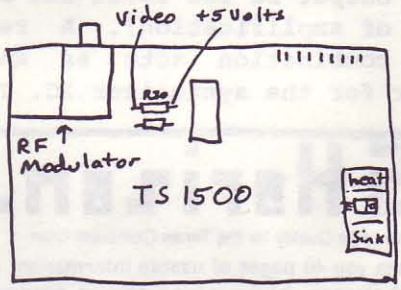


For monitors that come only with 75 ohm input, you will need to build a small driver circuit to the 75 ohm input of the monitor. This driver circuit can be a simple transistor emitter-follower circuit using the input impedance of the monitor as the load. Here again, a few monitors have a slight DC potential on the input, so some sort of isolation must be used. A 0.1 micro-Farad capacitor will work fine.





The video in the ZX81/TS-1000 can be found on one of the wires leading into the RF modulator. The lead to the left is video (facing from the front) and plus five volts is the center wire (+5 volts is needed for the transistor circuit).



On the TS-1500, the video signal can be found on pin 11 of U1 inside the modulator and +5 volts can be found on pin 8. The video can also be found on the left side of R30 and +5 volts on the right side of R30 (facing the front of the computer). These second two places are easier to get to. As far as adding a connector, I just clipped the existing leads at the RF connector and ran my new circuitry over to the existing connector which gives a cleaner look from the outside, but you will not be able to use a regular TV again.

-- Joe Williamson

Zebra Talker — A Review

The Zebra Talker is a hardware and software combination that will allow you to synthesize human speech. The system is based around the Votrax SC-01 Speech Synthesizer IC which produces 45 basic speech sounds and links them together to make speech. Approximately 1400 words are able to be created using this device. A phoneme editor and text-to-speech software come with the package.

The hardware portion of the Zebra Talker is basically an I/O port (191) connected to the Votrax speech synthesizer. The interface has it's own power supply so as to not use any of the computer's power. A sound output cable leads away to be connected up to your monitor audio input or some other amplifier (the output is low level and requires some type of amplification). A resistor-capacitor combination acts as an clock oscillator for the synthsizer IC. There is no on-off switch, power being supplied by plugging in the cable.

The Z Talker comes with the Votrax speech dictionary, so even if you had no software, you could create speech by just OUTing the proper values to port 191 and then use PRINT IN 191. To make this easier, a phoneme editor program is supplied to let you easily "build" your own speech.

The editor lets you build up your words one sound at a time using the Votrax dictionary or your own guessing. After you have built up a word(s), you can print out the sequence of sounds along with the Votrax symbol, the hex and decimal equivalent, and the 2068 character. For example, if you want it to say "computer", you would enter the following sequence of sounds as given in the Votrax dictionary:

k uh1 m p y1 iu u1 t er

Notice the different "vowel" sounds. There are 36 in all. A table containing special vowel-phoneme combinations is also given in the dictionary. This is not new; if you open any good sized dictionary, they will usually have phonetic representations at the bottom of the page. This idea is used here to create speech from a set of common sounds!

The second program contains a text to speech routine that allows you to just type in words and the computer will speak them! This is the best part of the package! Using stream #4, all text is sent to the synthesizer. The machine code can be easily added to your own program at location 59000 and is 6000 bytes long.

The use is very easy and almost completely transparent to the user. All you have to do is enter your text into your programs with PRINT #4 statements. For it to say "computer talks", all you would have to do is enter into your program:

```
10 PRINT #4;"computer talks"
```

The text to speech program will handle about 90% of all words entered. The program checks for combinations of letters and creates the proper sequence of sounds

to produce the spoken word. Due to certain unusual combinations and so many rules in the English language, some words come out pronounced wrong. In the last example, the word "computer" comes out sounding like "compooter". To correct the pronunciation, you need to "fudge" the spelling. To make "computer" sound right you need to enter "compu ter".

The sound from the Z Talker is very intelligible and can be changed in pitch by a simple POKE. There are some sounds it has trouble with though. It has trouble with the "p" sound. It sounds more like a quiet "t" in most instances. But some sounds are perfect like when you have it say "six".

If you really want to change the pitch drastically, you can change capacitor C2 to a higher or lower value and make it range from sounding like Jaba the Hut to Kermit the frog!

I would like to see a nice case for the interface instead of the two pieces of cardboard stuck on each side. Also, I would like to see the power drawn from the computer instead of a separate supply and I wish that they provided a longer audio cable so it would reach the back of my monitor. One last thing, it should have a 2068 wide feedthrough connector so as to add other 2068 interfaces.

Over all, I'm impressed. The construction of the interface, the quality of the programs, even the sound is pretty good. Using the text-to-speech, it's fun to see how well it pronouces all the words you tell it to and to see what happens when you make words up. And remember, it will sound the same no matter what computer it's on.

Available from: Zebra Systems, Inc., 78-06 Jamaica Avenue, Woodhaven, NY 11421 (718) 296-2385

-- Joe Williamson

Hi-Res Graphics for the TS-1000

A Review of I.S.I.'s Software

"High Resolution Graphics MK. II" is a software high resolution graphics program for the TS-1000 line of computers. It has the ability to plot points, unplot points, write in upper and lower case, test a point on the screen, invert the hi-res screen, and copy the hi-res screen to the printer. The resolution comes as 192 X 128 but can be expanded up to 192 X 256 in some applications.

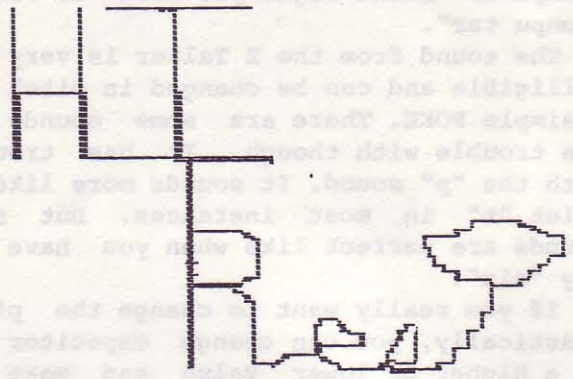
The program auto-runs after loading and gives you an example of hi-res with both upper and lower case text telling where the addresses are for each operation. You use RAND USR XXX in your program each time you wish to access a function. Each function is easy to use and examples are given.

Included in the documentation is a short program which will allow you to draw on the screen using the arrow keys (see example), and a test program for writing in upper and lower case.

As an example, to use upper and lower case, you must first clear the hi-res screen using RAND USR 16572, call the hi-res routine with RAND USR 16514, place in a PRINT statement what you wish to print in upper and lower case (using inverse characters for upper case), POKE 16417 with the line you wish it to appear in, and call the print routine with RAND USR 17285.

The characters are not the best in the world; I like the upper and lower case letters on the 2068 much better. If I knew where the character table started, it would be easy to change to a more pleasing character set.

```
HIGH RESOLUTION GRAPHICS PROGRAM
          Version 2
    (C) 1984 by Craig Bird

16514-Goto high res screen
16563-Return to Sinclair display
16572-Clear high-res display
16594-Plot a point
16598-Unplot a point
16602-Test a point
17285-U/L case printer
17572-Print out high-res screen
17600-Invert high-res screen

Lines 20 to 320 may be removed
```



```
This is a Test of HIRES Grahics
```

Another thing that isn't explained in the manual is that you must be in SLOW mode in order to see what is being printed. The plot routines are much quicker than the Sinclair plot.

The code is short and only takes about a minute to load. I am very happy with this program. It does a lot and is easy to use. Best of all it is inexpensive. They also list a word processor using the hi-res routines which should be pretty good from what I've seen here. They state in several places that it only works with the TS-1000 and ZX81, but it loaded and ran fine on my TS-1500 as well.

Available from: Inter-Pacific Systems Inc. 3770 Duke Rd, RR #1, Victoria, BC, Canada V8X 3W9. $7.49 (US).

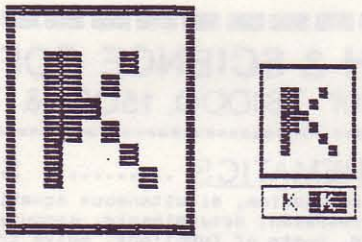
-- Joe Williamson

Creating Your Own TS-2068 Character Set

One of the features that made me get my 2068 was the possibility of changing the character set. But, it didn't seem to be worth the trouble until I saw the special alphabet used in a program that was shown at a recent TUG meeting. As you can see in the listing of CHR$, it is well worth it in better legibility, and it's prettier too.

I really enjoy making character sets with this program which can be used to make more than just one regular and one USR set by changing the values of S and T which are the beginning of the second character set and UDG set respectively.

After you type in the program and RUN it you can start out by copying the Sinclair character set and then changing it. Sets can also be saved as bytes for use in other programs. Line 6000 switches the computer back into the normal ROM characters while line 6010 puts the new ones into use.



arrow keys ▒:1 :0 ENTER ESC:4

The character editor routine is entered by pressing a character you wish to change. While in the edit mode, use the arrow keys to move the dots around. Press 1 to plot, press 0 to unplot, press 4 to return to the menu, and press enter to POKE the new character.

I don't think you will ever be content with just the old alphabet again.

-- John Monkus

```
 10 REM CHR$
 20 REM ▒▒▒▒ 6-26-85 ▒▒▒▒
 22 REM ▒▒ BY JOHN MONKUS ▒▒
 30 DIM A(8): RESTORE : FOR I=1
TO 8: READ A(I): NEXT I
 32 DATA 128,64,32,16,8,4,2,1
 40 LET S=64600: LET T=65368: L
ET U=1
 100 GO TO 1790
 680 GO SUB 950: LET H=T+8*(CHR-
144): GO TO 710
 700 GO SUB 950: LET H=S+8*(CHR-
32)
 710 FOR I=1 TO 8: LET HH=PEEK (
H+I-1)
 712 FOR J=1 TO 8
 720 IF HH>=A(J) THEN LET HH=HH-
A(J): LET S$(I,J)="▒"
 730 NEXT J: NEXT I
 790 GO TO 2000
 950 DIM S$(8,8): FOR I=1 TO 8:
LET S$(I)="        ": NEXT I: RE
TURN
 960 PRINT AT 14,12; FLASH 1;"▒▒
▒▒▒▒▒": FOR I=0 TO 767: POKE (S
+I),PEEK (15616+I): NEXT I: LET
U=0: GO TO 1800
 999 ON ERR RESET : OVER 0: BEEP
 0.07,31: BEEP 0.07,28: PAPER 7:
 INK 9: BRIGHT 0: BORDER 6: STOP

1010 PRINT AT Y+3,X+7;S$(Y,X): R
ETURN
1800 ON ERR RESET : BORDER 1: PA
PER 1: INK 9: CLS : POKE 23658,1
1810 PRINT AT 5,0;: GO SUB 5500:
1820 PRINT AT 19,2;"▒:copy Sinc
lair set "" "":stop";AT 21,4;"▒:l
oad CHR$   ▒:save CHR$"
1840 DIM C$(1): INPUT ;TAB 10;"C
HARACTER?";C$
1842 IF C$="▒" THEN GO TO 7000
1844 IF C$="▒" THEN IF U=1 THEN
GO TO 960
1846 IF C$="▒" THEN GO TO 7100
1848 IF C$="▒" THEN COPY
1850 IF C$=" " OR C$=" " THEN GO
 TO 999
1860 LET CHR=CODE C$
1870 IF CHR>143 AND CHR<165 THEN
 GO TO 680
1880 IF CHR>32 AND CHR<127 THEN
GO TO 700
1900 GO TO 1800
2000 OVER 0: BORDER 6: PAPER 6:
BRIGHT 0: CLS : INK 9: PAPER 8:
PRINT AT 3,7;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒";: FOR I
=1 TO 8: PRINT AT I+3,7;"▒";: PAP
ER 7;S$(I);: PAPER 8;"▒": NEXT I:
 PRINT AT 12,7;"▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒▒"
2010 POKE 23658,8: GO SUB 3000:
GO SUB 5000
2200 PRINT AT 14,0; PAPER 6;"arr
ow keys ▒:1 "; PAPER 7;" "; PAPE
R 6;":0  ENTER  ESC:4  ": LET X=
4: LET Y=4
2210 PRINT AT Y+3,X+7; BRIGHT 1;
 INVERSE 1;S$(Y,X)
2230 IF INKEY$="5" THEN : IF X>1
 THEN GO SUB 1000: LET X=X-1:
2240 IF INKEY$="8" THEN : IF X<8
 THEN GO SUB 1000: LET X=X+1:
2250 IF INKEY$="7" THEN : IF Y>1
 THEN GO SUB 1000: LET Y=Y-1:
2260 IF INKEY$="6" THEN : IF Y<8
 THEN GO SUB 1000: LET Y=Y+1
2300 IF INKEY$="0" THEN : BEEP 0
.02,44: LET S$(Y,X)=" ": PRINT A
T Y+3,X+7;S$(Y,X): GO SUB 3890:
PLOT INVERSE 1;171+X,88-Y: PLOT
187+X,88-Y
```

```
2310 IF INKEY$="1" THEN : BEEP 0
.04,32: LET S$(Y,X)="■": PRINT A
T Y+3,X+7;S$(Y,X): GO SUB 3890:
PLOT 171+X,88-Y: PLOT INVERSE 1;
187+X,88-Y
2350 PRINT AT Y+3,X+7;S$(Y,X)
2370 IF INKEY$="B" THEN : GO SUB'
 950: GO TO 2000
2380 IF INKEY$="4" THEN : GO TO
1800
2390 IF INKEY$=CHR$ 13 THEN BEEP
 0.3,21: GO TO 4000
2410 GO TO 2210
3000 REM  ■■SMALL PRINT■■
3010 FOR I=6 TO 9: PRINT AT I,21
; PAPER 7;"      ": NEXT I
3020 PLOT 164,130: DRAW 38,0: DR
AW 0,-37: DRAW -38,0: DRAW 0,38:
 DRAW 39,0: DRAW 0,-39: DRAW -40
,0: DRAW 0,39
3030 FOR K=1 TO 8 STEP 2: FOR L=
1 TO 8 STEP 2:
3040 GO SUB 3910: NEXT L: NEXT K
3090 RETURN
3890 IF Y/2=INT (Y/2) THEN LET K
=Y-1
3892 IF Y/2<>INT (Y/2) THEN LET
K=Y
3894 IF X/2=INT (X/2) THEN LET L
=X-1
3896 IF X/2<>INT (X/2) THEN LET
L=X
3900 PRINT AT 5+(K+1)/2,20+(L+1)
/2; OVER 0;" "
3910 IF S$(K,L)="■" THEN PRINT A
T 5+(K+1)/2,20+(L+1)/2; OVER 1;"
▪"
3920 IF S$(K+1,L)="■" THEN PRINT
 AT 5+(K+1)/2,20+(L+1)/2; OVER 1
;"▪"
3930 IF S$(K,L+1)="■" THEN PRINT
 AT 5+(K+1)/2,20+((L+1)/2); OVER
 1;"▪"
3940 IF S$(K+1,L+1)="■" THEN PRI
NT AT 5+(K+1)/2,20+(L+1)/2; OVER
 1;"▪"
3950 RETURN
4000 REM  ■■■Poke CHR$■■■
4040 LET A=0: LET B=0: LET C$=CH
R$ CHR: GO SUB 4900
4060 GO SUB 5600: PRINT AT 4,22;
 PAPER 7;C$; INVERSE 1;C$: GO SU
B 6000
4200 PRINT AT 14,0; PAPER 6;"
     O.K.?   yes or no          ";
BEEP 0.05,36
4210 IF INKEY$="Y" OR INKEY$=CHR
$ 13 THEN GO TO 1800
4220 IF INKEY$="N" THEN BEEP 0.0
7,28: BEEP 0.07,25: PRINT AT 4,2
2; PAPER 6;"  ": GO TO 2200
4230 IF INKEY$="9" THEN GO TO 99
9
4250 GO TO 4201
4920 IF CHR>143 THEN LET X=T+8*(
CODE C$-144): GO TO 4940
4930 IF CHR<128 THEN LET X=5+8*(
CODE C$-32)
4940 LET P=0: FOR I=1 TO 8: FOR
J=1 TO 8: IF S$(I+A,J+B)="■" THE
N LET P=P+A(J)
4950 NEXT J: POKE X+I-1,P: LET P
=0: NEXT I: RETURN
5000 REM  ■■■TINY■■■
5010 PRINT AT 11,21; PAPER 7;"
■"
5020 PLOT 164,89: DRAW 39,0: DRA
W 0,-11: DRAW -39,0: DRAW 0,11
5040 FOR I=1 TO 8: FOR J=1 TO 8:
 IF S$(I,J)="■" THEN PLOT 171+J,
88-I: PLOT INVERSE 1;187+J,88-I
5050 NEXT J: NEXT I: RETURN
5500 GO SUB 5600: PRINT TAB 0; P
APER 7;" !""#$%&'()*+,-./0123456
789:;<=>?"; GO SUB 6000: PRINT T
AB 0; PAPER 8;" !""#$%&'()*+,-./
0123456789:;<=>?"
5510 GO SUB 5600: PRINT TAB 0; P
APER 7;"@ABCDEFGHIJKLMNOPQRSTUVW
XYZ[\]↑_"; GO SUB 6000: PRINT TA
B 0; PAPER 8;"@ABCDEFGHIJKLMNOPQ
RSTUVWXYZ[\]↑_"
5520 GO SUB 5600: PRINT TAB 0; P
APER 7;"£abcdefghijklmnopqrstuvw
xyz{}©  "; GO SUB 6000: PRINT TA
B 0; PAPER 8;"£abcdefghijklmnopq
rstuvwxyz{}©  "
5530 GO SUB 5620: PRINT TAB 0;"
     "; PAPER 7;"▒CDEFGHIJKLMNO
PQRSTU"; PAPER 8;TAB 6;"ABCDEFGH
IJKLMNOPQRSTU"
5590 RETURN
5600 LET J=S-256: POKE 23606,J-2
56*INT (J/256): POKE 23607,INT (
J/256): RETURN
5620 POKE 23675,T-256*INT (T/256
): POKE 23676,INT (T/256)
5622 RETURN
6000 POKE 23606,0: POKE 23607,60
: RETURN
6010 POKE 23606,88: POKE 23607,2
51: RETURN
7000 REM  ■■SAVE CHR$■■
7010 INK 1: PAPER 5: BORDER 5: C
LS
7020 PRINT AT 9,1;"TITLE OF BYTE
S : ENTER= ""CHR$""""
```

```
7030 POKE 23624,41: DIM T$(10):
INPUT ;"10 CHR$ max (4=ESC)";U$:
 IF U$="4" THEN GO TO 1800
7032 IF U$="" THEN LET T$="   CH
R$    ": GO TO 7036
7034 LET T$=U$
7036 FOR I=1 TO 10: IF CODE T$(I
)<>32 AND CODE T$(I)>47 AND CODE
 T$(I)<58 THEN GO TO 7010
7038 NEXT I
7044 LET J=65536-S
7050 SAVE T$CODE S,J
7060 LET R=1800: ON ERR GO TO 79
50: PRINT AT 9,0;"      "; FLASH
 1;"REWIND TAPE TO VERIFY"; FLAS
H 0;"      ";AT 11,10;"""""""""
""";AT 11,11; PAPER 8; INK 8; O
VER 1;T$
7070 PRINT AT 19,0;: VERIFY ""CO
DE : GO TO 1800
7099 STOP
7100 REM     LOAD CHR$
7110 PAPER 2: INK 6: BORDER 2: C
LS
7120 PRINT AT 9,4; FLASH 1;"STAR
T TAPE TO LOAD BYTES"
7130 LET R=1800: ON ERR GO TO 79
50
7140 PRINT AT 16,0;: LOAD ""CODE
7150 GO TO 1800
7199 STOP
7950 PRINT #1;AT 0,7; FLASH 1;"T
APE LOADING ERROR";AT 1,2; FLASH
 0;" press any key to continue "
: PAUSE 4E4
7960 ON ERR RESET : GO TO R
8999 STOP
9000 REM  CHR$
9005 POKE 23658,8: POKE 23675,88
: POKE 23676,255
9010 CLS : PRINT AT 9,8; FLASH 1
;"DO NOT STOP TAPE"
9020 LOAD ""CODE
9030 GO TO 1800
9998 STOP
9999 PAPER 8: INK 9: PRINT AT 20
,0;: SAVE "CHR$" LINE 9000: SAVE
"   CHR$"CODE 64600,936: VERIFY
"CHR$": PRINT AT 20,0;: VERIFY "
  CHR$"CODE
```

Reviving the 2068 Keyboard

One of the complaints most often heard about the Timex 2068 and its keyboard is the "dead" keys and/or spacebar that so often develops. Here is a procedure that will often solve the problem.

An understanding of how the 2068 keyboard is made reveals the solution. The accompanying photo shows the constituent parts. When viewing the 2068 only the overlay and the keys are visible. In fact, under the overlay is a hard plastic sheet with all tne keys mounted through it. Under this sheet is a rubber membrane with a convex "bubble" formed precisely under each key in the layer above it. Mounted to the underside of each bubble or dome is a small conductive button. The bottom layer of the keyboard consists of the printed circuit board laid out as a matrix. Consulting a circuit diagram of the 2068 shows that the computer reads the keyboard by checking each vertical and horizontal line on the circuit board for a completed circuit. A closed circuit is made as the key presses the dome which presses the button across the two lines unique to that character on the keyboard.

The major problem with this arrangement is the build up of a resistive corrosion on the contacts of the circuit board. Lessening or remedying the problem is possible without opening your computer. Here are the steps:

(1) Carefully lift one corner of the keyboard overlay and gently lift off the complete overlay and lay it aside. You will find it stuck down with something akin to contact cement and will lift up without bending if you are careful.

(2) Unscrew the hard plastic sheet holding the keys in place. Turn the computer over while holding this sheet in place with your hand. The sheet will come out in your hand with all keys in place. Lay the sheet aside face down so the keys will not get out of place.

(3) Lift off the rubber sheet to reveal the circuit board beneath.

(4) Obtain some color TV tuner contact cleaner from Radio Shack along with some cotton tipped plastic swabs (Q-tips). Scrub each circular contact point on the circuit board giving special attention to the keys which were giving trouble and the space bar contacts.

(5) Reassemble your keyboard. Use contact cement to help re-stick your overlay.

Now try it out. I found that all my "dead" keys but one, and my space bar, had their old life back. Only the "i" key still has a little difficulty contacting.

-- Richard Cravy

WORM — A Type-it-yourself Game

Have you been looking for a game for the 2068 that doesn't require lightning fast reflexes and nerves of steel? Well, Worm will give you a chance to play a game without dodging/blasting ten zillion human eating, earth destroying thingamagigs.

As you type in the following program, there are a couple of lines that you should pay special attention to.

In line 20, notice the INPUT "" and the PRINT #1; statements. The INPUT"" will clear the bottom two lines only! The PRINT #1; then allows printing on the bottom line! A PRINT #0; will allow printing on the next to the bottom line.

Line 195 has POKE 23568,8 which puts the computer into CAPS LOCK mode to accept your initials as capitals. POKE 23568,0 returns you back to lower case mode. Also included in the program is a routine for checking high score and allowing input of initials before the scoreboard is printed.

-- G A Smith/Austell, GA

```
  5  RANDOMIZE : DIM a(11): DIM
 p$(11,3): GO TO 220
  10 CLS
  20 INK 5: FOR i=k TO k+long: P
RINT AT CODE a$(1,i),CODE a$(2,
i);"O": GO SUB 40: GO SUB 120:
NEXT i: INPUT "": PRINT #1; INK
 5;"Lives=";liv;TAB 13;"Score="
;sc;" "
  25 GO SUB 35: GO SUB 120: LET
cnt=cnt+1: IF cnt=13 THEN  LET
g=g+RND: GO SUB 170: LET cnt=0
  30 GO SUB 35: LET g=g+RND: GO
TO 20
  35 FOR q=1 TO 2: PRINT AT CODE
 a$(1,1),CODE a$(2,1);" ": LET
a$(1,1 TO 629)=a$(1,2 TO 630):
LET a$(2,1 TO )=a$(2,2 TO ): LE
T k=k-1: NEXT q: RETURN
  40 LET a= STICK (1,1): IF j=0
AND (a=5 OR a=6 OR a=9 OR a=10)
 THEN  GO TO 70
  45 IF j=0 AND  STICK (1,1)<>0
THEN  LET dir= STICK (1,1): GO
TO 70
  50 IF INKEY$="5" THEN  LET dir
=4
  55 IF INKEY$="6" THEN  LET dir
=2
  60 IF INKEY$="7" THEN  LET dir
=1
  65 IF INKEY$="8" THEN  LET dir
=8
  70 IF dir=1 THEN  LET L=L-(1 A
ND L>1): GO TO 90
  75 IF dir=8 THEN  LET c=c+(1 A
ND c<32): GO TO 90
  80 IF dir=2 THEN  LET L=L+(1 A
ND L<22): GO TO 90
  85 IF dir=4 THEN  LET c=c-(1 A
ND c>-1)
  90 IF odir<>dir THEN  BEEP .07
,5: LET odir=dir
  95 LET z$=SCREEN$ (L,c): IF z$
="#" OR z$="O" THEN  BEEP .5,33
: FOR q=1 TO 5: BEEP .1,-44: NE
XT q: GO TO 170
 100 IF z$="^" THEN  LET sc=sc+1
*(1+liv): BEEP .03,5: BEEP .03,
9
 105 IF z$="@" THEN  LET sc=sc+1
*(1+liv): BEEP .03,0: BEEP .03,
3: BEEP .03,5: BEEP .03,7: BEEP
 .03,9
 110 IF z$="*" THEN  LET sc=sc+3
*(1+liv): BEEP .03,0: BEEP .03,
5: BEEP .03,9
 115 LET k=k+1: LET a$(1,k)=CHR$
L:LET a$(2,k)=CHR$ c:RETURN
 120 IF RND<.7 THEN  RETURN
 125 LET n=INT (19*RND)+1: LET m
=INT (RND*29)+1: LET z$=SCREEN$
 (n,m): IF z$<>" " THEN  GO TO
145
 130 IF RND>.3 THEN  PRINT  INK
4;AT n,m;"^": RETURN
 135 IF RND>.1 THEN  PRINT  INK
6;AT n,m;"*": RETURN
 140 PRINT  INK 3;AT n,m;"@": BE
EP .01,13: RETURN
 145 IF z$="O" OR z$="#" THEN  R
ETURN
 150 PRINT AT n,m;" ": RETURN
 155 LET long=long+RND: FOR q=1
TO INT (g)
 160 LET n=INT (18*RND)+2: LET m
=INT (29*RND)+1: IF SCREEN$ (n,
m)="#" OR SCREEN$ (n,m)="O" THE
N  GO TO 160
 165 BEEP .1,7: BEEP .1,9: PRINT
  BRIGHT 1; INK 2;AT n,m;"#": N
EXT q: BRIGHT 0: RETURN
```

```
 170 LET zz=zz+1: LET liv=liv-1:
 IF liv>0 THEN  GO TO 265
 175 CLS : RESTORE 9999: PRINT
INK 4;"You are dead! Your score
= ";sc: FOR i=1 TO 11: READ a,b
: BEEP a,b: NEXT i
 180 FOR i=1 TO 10: IF sc>a(i) T
HEN  GO TO 190
 185 NEXT i: GO TO 200
 190 FOR k=10 TO i STEP -1: LET
a(k+1)=a(k): LET p$(k+1, TO )=p
$(k, TO ): NEXT k
 195 PRINT  INK 4;"Your sore= ";
sc;" & is # ";i;"!": PRINT "Key
 in your 3 initials & press ENT
ER.": POKE 23658,8: INPUT  LINE
 p$(i): LET a(i)=sc: POKE 23658
,0
 200 PRINT  INK 6;TAB 9;"TOP 10"
: FOR i=1 TO 10: LET z$=STR$ i:
 PRINT  INK 6;TAB (10-LEN z$);i
;".";p$(i);".....";a(i): NEXT i
: PRINT  INK 5;'''"Press("; FLAS
H 1;"P"; FLASH 0;")lay OR ("; F
LASH 1;"Q"; FLASH 0;")uit."
 205 LET Z$=INKEY$: IF Z$="P" OR
 z$="p" THEN  GO TO 220
 210 IF
Z$="Q" OR Z$="q" THEN  STOP
 215 GO TO 205
 220 PAPER 0: LET liv=5: LET sc=
0: INK 5: BORDER 0: CLS : PRINT
 TAB 12; FLASH 1;"WORM"; FLASH
0: PRINT ''TAB 3;"Everybody lov
es to play WORM!"
 225 PRINT '"In WORM, you are an
 ever growing& always hungry ce
ntpede."'"You move around the a
rea trying not to touch the red
 areas or  yourself!"
 230 PRINT "To touch a red area
or yourself is certain death &
causes you to lose one of your
lives."'"You score 1 point by
landing on the "; INK 4;"^"; IN
K 5;" (leaf) or 3 points for th
e "; INK 6;"*"; INK 5;" (lemon)
."
 235  PRINT "The "; INK 3;"@"; I
NK 5;" (flowers) are 5 points!"

 240 PRINT "You score bonus poin
ts accordingto the life level y
ou are on."'"Press any key.": P
AUSE 0: CLS
 245 PRINT ''''"You may use the a
rrow keys or a joystick. A BEEP
 will sound to "'"let you know
your move has been registered."

 250 PRINT '"If you do not turn,
 you continuein the direction y
ou were going."'''"Good Luck! &
Happy eating!"'''"Press 1 for ke
yboard."'"Press 0 for joystick.
"
 255 LET j=CODE INKEY$-48: IF j<
0 OR j>1 THEN  GO TO 255
 260 CLS : LET zz=0: LET long=3:
 LET k=1: LET L=k: LET c=k: LET
 cnt=zz: LET dir=long-k: LET g=
-13: DIM a$(2,630): LET odir=di
r: FOR i=L TO dir: LET a$(1,i)=
CHR$ i: LET a$(2,i)=CHR$ i: NEX
T i: GO TO 10
 265 CLS : PRINT  INK 5;''''"You
got killed!"'''"Your score= ";sc
'''"Only ";liv;" live(s) left!"'
'"Press a key or fire button."
 270 IF  STICK (2,1)=1 OR INKEY$
<>"" THEN  GO TO 260
 275 GO TO 270
9999 DATA .75,4,.75,4,.2,4,.75,4
,.3,6,.75,6,.2,4,.6,4,.3,3,.7,4
,.74,4
```

SPECIAL FEATURE

Adding a "Real" Keyboard to Your 2068

Probably the most common complaint I hear about the 2068 is about the keyboard. Although it does work well, it lacks the feel of a full sized keyboard as found on Commodore, Atari, and others, not to mention some of the missing (single dedicated) keys such as the period, comma, semi-colon, and slash keys. In fact, a leading computing magazine recently named it "turkey of the year" because of its powerful features while lacking a decent keyboard!

We decided to gather some of the popular Spectrum replacement keyboards and try to adapt them to the 2068 and report on how they work and feel. The keyboards we tested were the AMS Lo-Profile, Saga 1 Emperor, Lazer 62, and the English Micro Connection 2000 Keyboard (EMC 2000). This last one is available now for the Spectrum, and soon for the 2068.

Each one had its own pros and cons, and as it turned out, the less attractive it was, the more user-friendly it was! All required removing the Spectrum printed circuit board and installing it in the new keyboard housing. Installation was quick and easy for all and provided easy access to the rear connections. All the keyboards we tried came with Sinclair legends on the keys.

In judging these keyboards, I was looking for proper layout--meaning one that has keys in the same general location as on a standard typewriter. As it turned out, none did this exactly, but some did come close. You learn how to type on a "standard" keyboard; why change it? Of course if you don't know how to type, it doesn't make any difference how it's laid out. I was also looking for one that feels comfortable to use.

THE SAGA 1 EMPEROR

The Saga 1 is in an off-white plastic housing and is the same size as the 2068. There are 67 keys in all, but none of the "extra" keys are dedicated--meaning that you still have to press either the SYMBOL

SAGA 1

or CAPS SHIFT to get the character you want. The "extra" keys are: four arrows, RUN, LIST, LOAD, SAVE, 0, *, #, four symbol shifts, Graphics, =, CLS, DELETE, CAPS LOCK, $, EDIT, ;, :, comma, period, and an extra ENTER key. The left caps shift is two keys away from the Z and the right cap shift is below and to the right of the space bar--A very user un-friendly keyboard.

The keys are a little hard to press but have a good overall "feel". All the keys are labeled in three colors, but you have to peel and stick on the labels yourself! This keyboard looks the nicest of them all, but is difficult to use. The keyboard tails are the same as used in the ZX81/TS1000, so problems could crop up from there as well. On a scale of one to ten, I give this one a 2. Priced at #49.95

AMS LO-PROFILE

This one is in an attractice black plastic housing with red graphics. There are 41 keys with three color graphics made into the key (like on a typewriter), and a 12 key numeric keypad to the right of the main keyboard. It is much the same depth as the 2068, but much wider due to the keypad.

Extra keys include a caps lock and a period (both require either caps or symbol shift). There is no caps shift on the

AMS LO-PROFILE

right side, but there is an extra one on the numeric pad that you could use instead.

The keys are a little stiff, but easier than the Saga. Again, the keyboard looks great, but is lacking dedicated keys. It is easy to use. It's basically a replica of the Spectrum key layout with the addition of a spacebar and numeric keypad. I give it a 6. Price is #49.95 ($65 from EMC).

LAZER 62

The Lazer comes in a cream colored plastic housing with a sheet metal bottom. (I understand that new models have a plastic bottom.) It is a little wider and deeper than the 2068, it actually has a lower profile than the AMS LO-Profile. A power switch on the rear keeps you from having to always un-plug your Spectrum.

It sports 62 keys and has true dedicated keys which means when you press the key labeled DELETE, you get the delete function with only one key press. This keyboard is buffered which makes sure that it doesn't load down the data and address lines more than is necessary. The printed circuit board is easy to get to, so it is possible to move some of the keys around to your liking.

The dedicated extra keys are: the four arrows, $, #, (,), EDIT, DELETE, CAPS LOCK, ;, :, =, comma, period, /, *, and extended mode. This keyboard comes the closest to imitating a typewriter keyboard that most typists are used to. The only drawback here is that there is no right side caps shift. The labels are the peel and stick kind in one color (white) on charcoal colored keys. You have to stick on the labels yourself.

The keys feel very good but are a little noisier than the others. On the one that I tried, the space bar was a little dead. Also the space bar is not centered below the main keys but offset to the right which throws your perspective off when positioning your hands and fingers. A little more expensive with the added electronics: #65 ($89 from EMC) I give this one a 9.

LAZER 62

EMC 2000 KEYBOARD

This keyboard is in a black plastic housing and about the same size as the 2068. It has 53 keys and a 15 key numeric pad. This one also has dedicated keys: the four arrows, EDIT, DELETE, break, graphics, caps lock, +, *, period; three user dedicated keys (will be dedicated on subsequent models), and RUN. The RUN key is interesting in that it actually RUNs the program with one keystroke! The labels come in two colors and are part of the keys like the Lo-Profile.

ENGLISH MICRO 2000

This keyboard uses diode and tansistor switching to obtain the extra keys and

seems to work as well as the Lazer. The keyboard has a great feel with a lot of spring to the keys. The Enter key is one row too high which takes a little getting used to and I would like to see dedicated period and comma keys where they belong. It is easy to get to the printed circuit board for changing keys more to your liking.

English Micro Connection sells these for $69. I give this one a 9 also with the slight advantages of it having a numeric keypad, legends permanently attached, and smaller size over the Lazer 62. The rest of the keyboards are also available from EMC and from England. Check current issues of ZX Computing, Your Spectrum, etc.

After I had tried all of these on the Spectrum, I set out to try them on the 2068. As it turned out, the keyboards could easily be connected to the 2068 as long as the "tails" could be unsoldered and twisted - possible only on the Lazer 62, the Lo-Profile, and the EMC 2000. The Spectrum has two tails. One tail has eight connections and the other has five. The 2068 uses one tail of 13 connections to one connector.

In the 2068, they used the same pin-out as the Spectrum, but all in a row. The tail with eight "pins" plugged into the right side of the 2068 connector (facing from the front of the computer) and the tail with 5 "pins" must be rotated (so that pin one is now five and vice-versa) and is plugged into the 2068 connector immediately to the left of the eight pin connector. The 2068 socket has 14 positions and the final unused connection on the far left is a ground.

Connected in this way I could use all the extra dedicated keys, and at last, had a full sized keyboard for my 2068! All the keyboards we tried had plenty of room inside for the 2068 board to fit without too much modification to the base of the new keyboard. I saw no easy way to utilize the cartridge port once the 2068 was fitted. However, a hinge arrangement where the front would lift up looked like a good possibility.

One last bit of info: the TS 1500 will fit into any of these cases and work just fine with the connections being the same as the Spectrum!

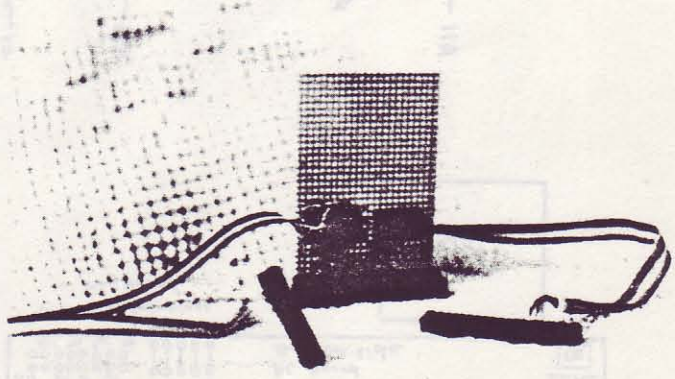
-- Joe Williamson

A Keyboard Interface for Any Timex Computer

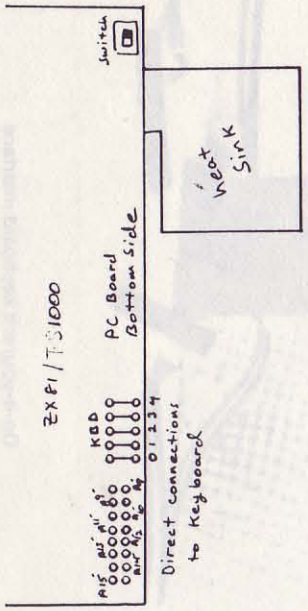
For those who do not wish to go into their computer to connect a new keyboard, here is an interface which you can plug on to the rear expansion buss. You can easily add on one of those TI surplus keyboards which are selling for as low as five dollars.

This interface uses the same type of decoding as the ULA inside each of the computers and will work on all Sinclair computers, including the 2068 and the Spectrum. The interface is basically an input port which is scanned every so often to see if a key has been pressed. The way shown here does not buffer the address and data lines very well, so you will need to use short as possible wires running from the keyboard to the interface and be careful for shorts. I used eighteen inches on mine with no problem.

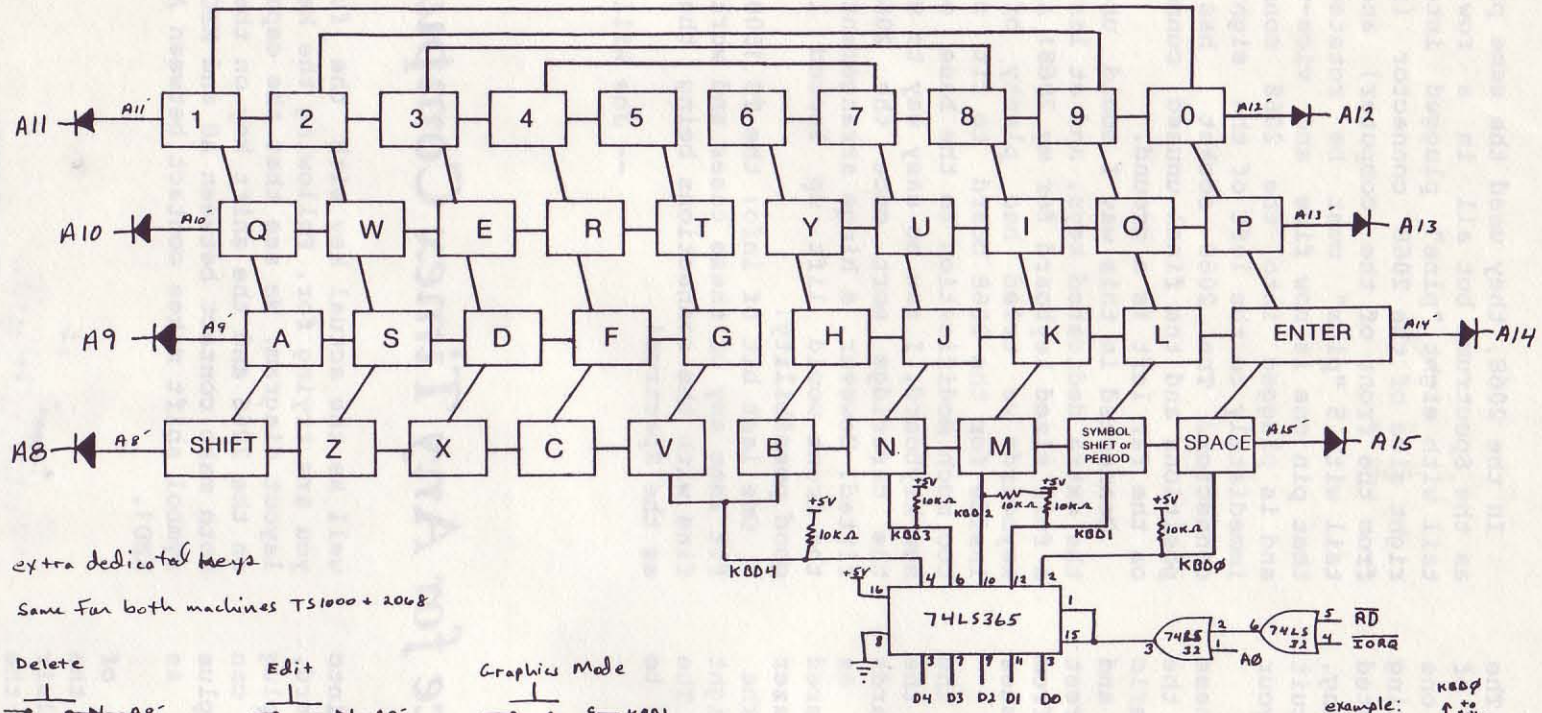
Adding dedicated keys is easy. Most will require that the caps or symbol shift be initiated (shift on the TS 1000) as well as the actual key with the function you are trying for. Following the keyboard layout diagram, We see that the caps shift on the 2068 and the shift key on the 1000 both make contact between A8 and KBD0. The symbol shift makes contact between A15 and KBD1.



Do-it-yourself keyboard interface

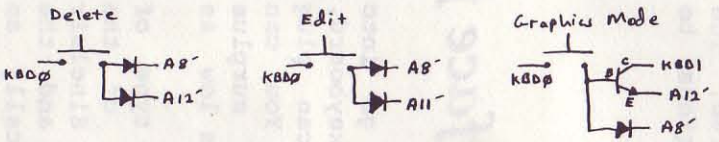


Full sized keyboard attachment for EXPI/TS1000 + TS2068



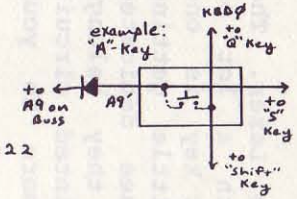
extra dedicated keys

Same for both machines TS1000 + 2068

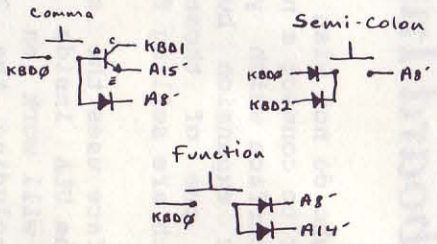


All diodes are 1N914/1N4148

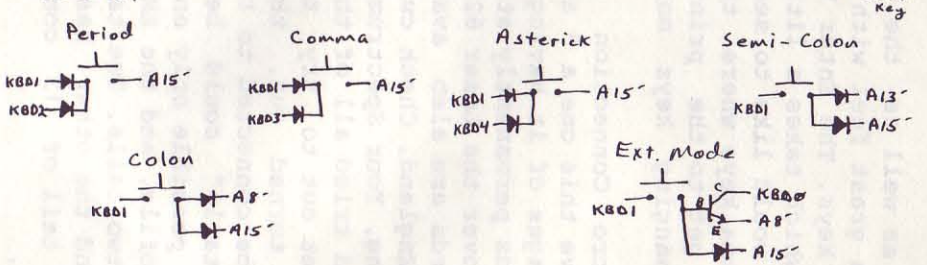
All transistors are 2N3904 or 2N2222

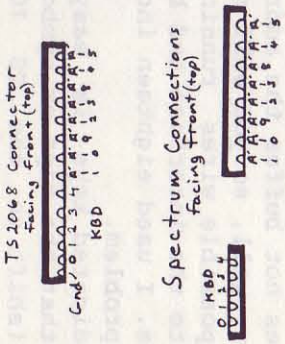


TS1000:



TS2068:





Adding on the "extras" is easy, requiring the addition of two diodes. Some require the addition of a transistor and diode. It all depends on where the "extra" appears on the keyboard matrix. For example, the period on the 2068 resides at the intersection of A15 and KBD2 and requires the symbol shift to be pressed. Symbol shift is at the intersection of A15 and KBD1. A15 is shared by both keys and must make contact with both KBD1 and KBD2. The two diodes are added for isolation (see diagram for period) so that no shorts appear for the rest of the keyboard matrix.

Adding the comma on the TS 1000 will require contact between KBD0 and A8 as well as contact between KBD1 and A15. To accomplish this, a separate switching action must take place for KBD1 and A15 - the 2N3904 transistor works fine for this task. When the key is pressed, KBD0 and A8 make contact for the SHIFT operation and at the same time, the transistor is "turned on" to make contact between A15 and KBD1 to give the comma. See the diagrams to add some of the more popular funtions.

The extra keys that I like to have are: DELETE, EDIT, period, comma, semi-colon, colon, asterisk, graphics, and EXTENDED mode (shifted FUNCTION on the 1000). Because they lie in the same position and require the same shift key, DELETE, EDIT, and GRAPHICS mode are obtained the same way on both types of machines.

The keyboard matrix is just that - a matrix. In the diagram, wires running vertically and horizontally do not touch until a key is pressed. Each key has one set of two contacts so that the vertical lines go to one contact and the horizontal goes to the other. As said before, keep the wires short. To make them longer, you should buffer the address lines.

While testing the four keyboards for our keyboard review, I was able to connect all the keyboards we had to the 2068 using this interface and had them all work well. So upgrade that computer of yours so your friends won't come over and say "You do WHAT with that thing?!"

-- Joe Williamson

The Zebra Graphics Tablet: A Review

The Zebra Graphics tablet is a hardware and software combination using the popular Koala Pad graphics tablet--the same type used with Radio Shack, Apple, Commodore, and other computers.

The hardware portion consists of an I/O board with two integrated circuits, a few resistors and diodes, and two sockets into which the Koala Pad is plugged.

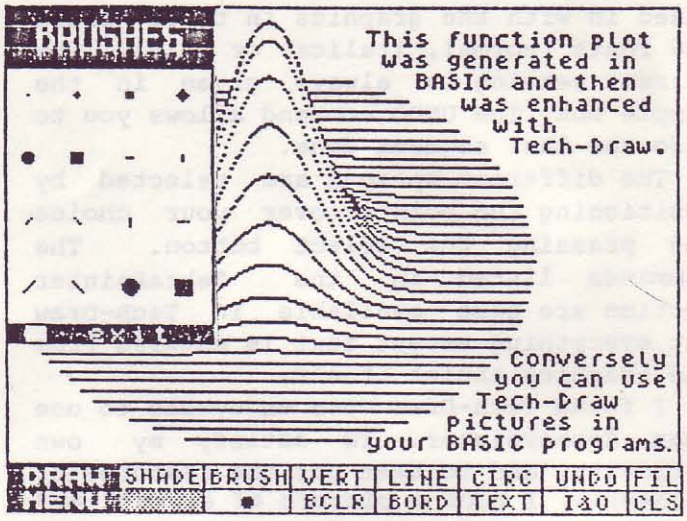
The Koala Pad has a pressure sensitive surface in the shape of your TV screen which can convert the touched portion of this surface to computerese which tells the 2068 where to draw on the TV screen. A special stylus comes with the pad, but any blunt object (even your finger) works well. Two buttons are also provided for screen control (such as writing or erasing). The drawing surface itself is 4.25" by 4.25". The entire unit is slightly larger than the 2040 printer.

The important part is the software. This is where the control comes in. The package is supplied with Zebra Painter. Zebra Painter takes the information sent from the Koala Pad and allows you to draw on the screen with the colors of your choosing. You can also give coordinates to make circles and straight lines.

Of the two control buttons, one is used for draw/erase, and the other is for command/select. You can choose what button does what with the "LEFTY" command. The screen commands are made by positioning the drawing stylus such that the corresponding pointer on the screen is over the command word and pressing the command /select button.

The keyboard commands are activated by positioning the screen pointer over the extreme right side of your menu and press the command/ select button. You are then prompted with "COMMAND?" So you type it in on the keyboard. Keyboard commands include: COPY screen to 2040 printer, CLS, WRITE text on screen, LEFTY button swap, STORE active screen to inactive screen, RESTR inactive screen to active screen, EXCHG inactive & active screens, SAVE screen to tape, and LOAD screen from tape.

You can choose any color INK, PAPER, and BORDER colors with screen commands and change them at any time. You have two sizes you can draw with, PEN is one dot



wide and high and BRUSH is five dots wide and high. Precision drawing can be accomplished by setting two points and selecting the LINE command which draws a straight line between the two defined points. Circles can be drawn by defining the center and edge. Directional drawing can be vertical only, hori- zontal only, or both.

Zebra Painter worked well and was easy to use. I found that I had the best control over the drawing by pressing the pad with the stylus perpendicular to the pad and don't rest any part of your hand on the surface (it may confuse it).

This article is really more of a software review of the different software packages available for the Zebra Graphics tablet. I also got Tech Draw and Zebra Circus Coloring Book. Tech-Draw is the program to get!

Tech-Draw was inspired by Apple's MacPaint for the Macintosh computer. Like MacPaint, Tech-Draw works in black and white, so what you see on your TV screen is what you get on your printer. Tech-Draw provides up to 35 black and white shades and patterns which gives you resolution to one pixel.

Tech-Draw can be printed out on either a large sized printer (with Aerco or Tasword interface), or the TS-2040. Copies to the large printer can be screen size or turned sideways to fill up a whole 8 1/2 by 11 sheet of paper.

Pop-up menus are given when choosing

shades and patterns or brush sizes and shapes (16). A FILL command is provided to fill in enclosed areas with the current shade or pattern. The shade and brush type can be changed at any time. Text can be mixed in with the graphics in three sizes and fonts (normal, italics, or bold). The current setting is always given in the sample box. The UNDO command allows you to undo the last segment done.

The different options are selected by positioning the pointer over your choice and pressing the select button. The commands listed in the ZebraPainter section are also available in Tech-Draw but everything except text is entered from the graphics tablet itself.

I found Tech-Draw more enjoyable to use than ZebraPainter. To satisfy my own curiosity, and to test out the features of Tech-Draw, I took a picture of a cat and cut it down to fit the face of the cat on the drawing surface and traced it onto the screen! It worked remarkably well, when you consider that I am no artist.

You can see from the sample that the face was widened when transferred over, but other than that, it traced very well. I used as many of the different paint brushes and shades as I could to aid me in enhancing the drawing.

The manual which comes with Tech Draw is very informative and contains many ideas and sample pictures. Uploading and downloading information for the modem is also given.

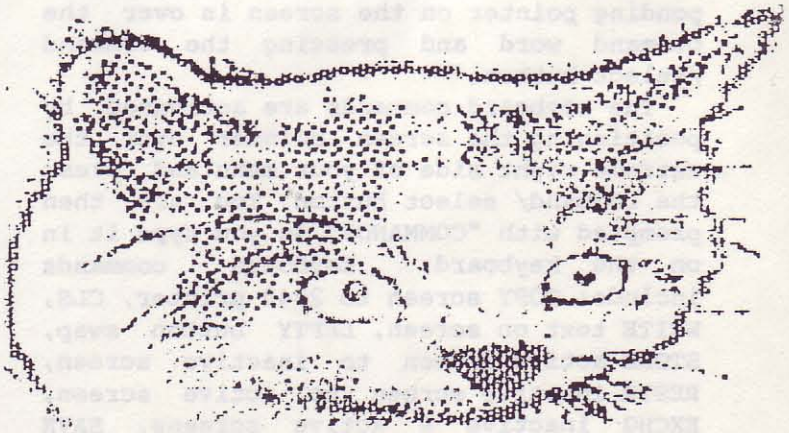
The third program I got for use with the graphics tablet was Circus Coloring Book which is just a fun program in which you go through and color in different pictures as you would with a regular coloring book.

At first I wasn't all that excited about the system; I just didn't see any use for it. But after I used Tech-Draw for awhile and made the cat and a few other drawings and discovered how easy it was to draw, I became very impressed and can see all kinds of uses for it! Other than not having a full 2068 edge connector feed-through, I have really no complaints.

Once again, this works the same no matter what computer its on. The software is what makes it work so well. The software (particularly Tech-Draw) is very professional and puts this system in the same league as say the MacPaint series for the Apple, Speaking of Apple, it would be nice if a mouse could be used with this interface as well. Rumor has it that one is being developed for the Spectrum in England.

Available from: Zebra Systems, Inc., 78-06 Jamaica Ave, Woodhaven, NY 11421 (718) 296-2385.

-- Joe Williamson



MTERM (Smart II)Telecommunications
— HINTS & TIPS —

The MTERM Smart II telecommunications program for the Timex/Sinclair 2068 personal computer is a fine value. This software package exceeds the capabilities of many terminal programs far exceeding it in cost. And because of MTERM's wide versatility, its users are still uncovering more secrets of its power.

In these few pages are included hints and tips as part of an addedum to my manual entitled, "Timex Sinclair Smart Terminal Telecommunications". These additional insights are a compilation obtained from the users of Smart II software and the author's experiences.

The following SMARTIPS are from Randy & Lucy Gordon of the Timex/ Sinclair Users Group, Cincinnati, Ohio:

* To get a file from a BBS you first need to set your conversion to none. Toggle your Buffer to open. Take in a file, then close your Buffer. Next, escape to Basic. The file should be saved like a normal Basic program with SAVE "filename". You will need the modem software to read this file later.

* To view the file that you just saved to tape, you must first LOAD the terminal software, escape to BASIC and LOAD "filename": PRINT USR 54016. This will return you to the terminal program with Buffer loaded. You must go to the Data Buffer menu to view or print the file. In view mode the spacerbar toggles the scrolling (on/off).

* To receive a BASIC file from another Sinclair user, you must both be in HEX conversion. Normal system setup (you may want to go to half duplex). Close the Buffer, escape to BASIC, and SAVE "filename". NOTE: Anything after VARS isn't transmitted (Buffer END=VARS). This means that any invisible variables are lost unless VARS is "moved" to accomodate the program variable stack. You must POKE VARS, E_LINE. To do this you must PRINT PEEK 23641 + 256* PEEK 23642(E_LINE), take the value and POKE it to 23627/23628 (VARS). You can call programs back into the computer like any other Basic file with LOAD "".

* To send a Basic file, first be sure it will fit in your Buffer. If you cleared you will get out of memory error if the file is larger than the Buffer area (26710-54016), give or take a few bytes. Get into the terminal mode and then go to the Data Buffer menu. Press T for Transmit. At the bottom of the screen the menu Prompt Screen will appear; press enter. Next, Character Delay will appear; again press Enter. Enter again to take you to the Main Menu. Press Enter one more time to begin transmission. If you are in Half Duplex you will see what you are sending echo back to your screen. When XMIT is finished you may do normal pick-up.

* To receive a machine code listing the set-up is the same as the Basic file, except when you escape to SAVE to tape. The BASIC editor will appear as though it has "crashed". (INVALID COLOR or NONSENSE IN BASIC, ect.). Ignore this garbage and SAVE "filename" CODE 26710, (the number of bytes in the Buffer). Then you must Load it back into the computer with Load "filename" CODE (proper or normal address), (number of bytes).

* To send a machine code program to another Sinclair user you must first POKE VARS, (53016) to leave room for Basic overhead. POKE 23627, 24: POKE 23628, 207. This gives a large Buffer to load Basic in. Then you Load "machine code" CODE 26710:PRINT USR 54016. You must be in HEX conversion. XMIT same as any other file.

* If by chance you can't get the dialtone of your phone back, a 2050 modem relay may be stuck open. Go to the main menu, press §E¶ to exit to Basic and enter WITHOUT line number OUT 119, 0.

* Some Bulletin Boards will not accept a CTRL-R or CTRL-T to open/close the buffer remotely. An alternative is to enter CTRL-S to stop tramsmission, then return to the Buffer menu and toggle the Buffer open or closed as required.

* MTERM patches for both TASMAN and AERCO parallel print interfaces are available for download from the Timex Bulletin Board on Zebra Systems. PHONE: (718)296-2229.

* One method of fixing all keyboard entries to upper case is to go to XLATE table §K¶ and change all lower case to upper case. These values can also be saved.

* The Bulletin Board SYSOP can read all your messages, even private ones. If you still want more privacy, how about sending ciphertext or cryptogram messages? The Smart II XLATE tabels facilitate enciphering a message, and the recipient to decipher it (provided they have the key algorithm). The folowing elementary example illustrates the principle involved:

Rotate the alphabet counter-clockwise by three letters, so that A=D, B=E, C=F,.....,
X=A, Y=B, ect. Where = denotes "replaced by" as in Basic programming.

If you send the PLAINTEXT message,

TIMEX IS GREAT

The CIPHERTEXT would be

WLPHA LV JUHDW

To do this, change XLATE table §K¶ so all keyboard entries will then be sent in ciphertext. The recipient can read the encrypted message by going to XLATE table §I¶ and changing it to the reverse, i.e., D=A, E=B, X=A, ect

* The Sinclair Basic commands IN and OUT operate by port command assignments (e.g. the assignments for the 2050 modem are 119 and 115 decimal). Using these commands you can program the 2068 in Basic to Autodial/Auoanswer thru the 2050 modem. Using the same procedure, you can program to redial, dial a sequence of phone numbers, etc. The following list of OUT command meanings is for reference:

OUT 119,0 - Hang up phone.
OUT 119,1 - Stop carrier tone; do not hang up phone.
OUT 119,2 - Start carrier tone.
OUT 119,3 - Open modem relay contacts.
OUT 119,4 - Close modem relay contacts.
OUT 119,31 - Take phone off hook for dail tone.
OUT 119,34 - Start carrier tone.

A typical application is programming a 5 cycle loop containing OUT 119,3 and OUT 119,4 in sequence. This would be the equivalent of dialing the number 5.

* The following list of popular Bulletin Boards have Timex/Sinclair coverage:

Zebra Systems (718)296-2229 NY Omni-net (718)837-2881 NY Compuserve Go PCS 54 OH Micro-Systems (305)832-2503 FL River Cities (304)652-1416 WV Serial Port (313)286-0145 MI -- Barry Carter

EDITOR'S NOTE: Barry's MTERM II manual is available for $6.50 at BOX 614, Warren, MI 48090.

Ultra Hi-Res Graphics on the Timex 2068

Amongst the differences between the Spectrum and the 2068, there are the 2068's video modes. These modes are not directly reached by BASIC. To use them, we must write some routines in machine language. This machine code toolkit is for the mode called "extended color". If we type in normal mode:

```
CIRCLE 125,87,50:PLOT 0,87:DRAW 1,0,255
```

we will see the flash attribute on eight bytes. In the extended color mode, each display file byte has its own attribute byte. The color resolution is multiplied by eight.

There is no use of POKEs with the toolkit. When we need to pass some information to the machine code routine, we use the form:

```
INPUT USR add,x,y
```

where add is the routine entry point, and x & y are the information needed by the routine.

First type in the HEXLOADER program and SAVE it to tape. RUN the program and wait. If an error is detected, the line number will be printed. If there are no errors in the DATA statements,an error report "OUT OF DATA" will occur. Then RUN 550 to save the toolkit code.

RANDOMIZE USR 62000 switches the extended color mode on and a welcome message should be printed at the top of the screen. If not, type PRINT USR 0 and LOAD the HEXLOADER to check the DATA lines for any errors. Remember, its very important to CLEAR 61999 before switching into extended mode.

Here is a summary of the toolkit's routines:

`RANDOMIZE USR 62000` enables D_FILE2

`RANDOMIZE USR 62048` clears D_FILE1 and D_FILE2. CLS will only clear D_FILE1. If we have something on the screen and we want to change the ink color without erasing the screen, INK x:RAND USR 62051 will do it. This entry point erases only D_FILE2, i.e. the attribute file.

`INPUT USR 62069,X,Y` attributes on PLOT. X=(8*PAPER)+INK. If we want a plot with yellow ink on blue paper, then
X=(8*1)+6=14
Y=FLASH/BRIGHT
if Y=1 then BRIGHT 1
Y=2 then FLASH 1
Y=3 then BRIGHT 1
and FLASH 1

Y=0 then BRIGHT 1 and FLASH 1
These two arguments are not optional.

INPUT USR 62105,X,Y fills a zone with the attribute X and Y.
X=(8*PAPER)+INK
Y=FLASH/BRIGHT
For example, enter CIRCLE 125,87,80 and PLOT INVERSE 1,125,87 to determine the filling starting point. If the screen PAPER is black and INK is yellow (if not, use PAPER 0:INK 6:RAND USR 62051), type INPUT USR 62105, 14,0 to fill the circle with green INK because X=(8*0)+6=14

PRINT AT X,Y;INK/PAPER/FLASH/BRIGHT;CHR$ USR 62220

prints the variable s$ with the different attributes than the current screen attributes. For example:

```
10 LET s$="This is a test..."

20 PAPER 1:INK 0:RAND USR 62048: REM CLS

30 PRINT AT 10,5; FLASH 1; PAPER 0, INK 6; CHR$ USR 62220. If you don't let s$ equal somethiNG, an error report is given.
```

RANDOMIZE USR 62292 scrolls D_FILE1 & 2 one character up. RAND USR 62295 will scroll up D_FILE2 only.

RANDOMIZE USR 62346 scrolls D_FILE1 & 2 one character down. RAND USR 62360 will scroll down D_FILE2 only.

RANDOMIZE USR 62446 scrolls D_FILE1 & 2 one character left. RAND USR 62461 for D_FILE2 only.

RANDOMIZE USR 62500 scrolls D_FILE1 & 2 one character right. RAND USR 62515 for D_FILE2 only.

TECHNICAL NOTES

Don't forget to always CLEAR 61999. When D_FILE2 is in use and the toolkit is in memory,there are 28268 bytes free to BASIC.

The UDG area now begins at 63256. The BASIC program begins at 31510. For a line 0, POKE 31511,0. To put machine code in REM statements, poke at 31514 upward. To SAVE a screen to tape, use:

```
SAVE "D_FILE1" CODE 16384,6143
SAVE "D_FILE2" CODE 24576,6143
```

At anytime, you can return to normal mode using OUT 255,0 and return to extended mode with OUT 255,2. When using the fill routine (INPUT USR 62105,x,y), if we reach the top or the bottom of the screen, an error report "Integer out of range" will occur. To overcome this situation, use ON ERR GOTO and ON ERROR RESET in your BASIC programs.

The DRAW command works but we don't have any control over the attribute. Same thing for CIRCLE. In extended color mode, attribute file2 is opened but not used. If you want you can use it to put machine code there. ATT_FILE2 is between 30720 and 31487 (767 bytes long). (Ed. note, only use RAND USR 62000 once.)

-- Real Gagnon
(544 Hermine #2, Quebec, Quebec, Canada G1N 2G6)

```
 1 REM HEXLOADER TOOLKIT ULTRA RES 2068  GAG-o85
 5 CLEAR 61999: LET a=10: LET b=11: LET c=12: LET d=13: LET e=14: LET f=15
 10 LET line=100: LET add=62000

 15 READ s$,sum: LET tot=0
 20 LET byte=16*VAL s$(1)+VAL s$(2): LET tot=tot+byte: POKE add,byte
```

```
  25 LET s$=s$(3 TO ): LET add=a
dd+1: IF s$<>"" THEN  GO TO 20
  30 POKE 23692,255: IF sum=tot
THEN  PRINT "Line ";line;" OK":
 LET line=line+1: GO TO 15
  40 BEEP .1,1: PRINT "Error at
line ";line: STOP
 100 DATA "01FEFECD99643E02CD8E0
E01FF00CD59FCCD60F2215AF406407E
D72310FB212067CD57F221006006203
E87772310FCC9CDE4083A8D5C320060
21006011016001",6628
 101 DATA "0018EDB0C9CDDC1BCD602
678FE002808CB18CB18CB18E6C0C5ED
4B7D5CCD032601002009C1788177C9C
DDC1BCD6026CDF9F2ED5B7D5CCDC0F2
2006CDDFF21418",8153
 102 DATA "F5ED5B7D5C15CDC0F2C0C
DDFF21518F6424BCD03264704487E07
10FDCB47C0CBC7410F10FD770100200
93AF8F277C91CCDC0F2200218F83A7D
5C5F1DCDC0F220",7828
 103 DATA "0218F83A7D5C5FC90078F
E002808CB18CB18CB18E6C0788132F8
F2C92A4B53ED4B595CE5ED422809E17
EFE5328052318F2CF0123237EFE0028
052318E6CF012B",6911
 104 DATA "462323C5CD41F3C17ED71
0F63E08D74EC9E52A845C3A8F5C1100
20190608772410FCE1C9CD390921006
011E05BD5E53E03012000C5E5EDB0D1
0EE0EDB0060709",6928
 105 DATA "3DC120F0413A8D5C12131
0FCE1D1247CFE6838D9EB732C20FCC9
21FF5711FF5B3E0001EDF302180D21F
F7711FF5B3A8D5C01EDF302D5E53E03
012000C5E5EDB8",7542
 106 DATA "D10EE0EDB806F909C13D2
0F0413AEDF3121B10FCE1D1257CF53A
EDF3FE00200EF1FE5030D0AF0620121
B10FC18BAF1FE7030C2AF0620121B10
FCC90000002101",7429
 107 DATA "401100403E0001EDF302C
D0AF42101601100603A8D5C01EDF302
01C000ED43EBF3011F00EDB03AEDF31
21323ED4BEBF30D20EAC921FE5711FF
573E0001EDF302",6744
 108 DATA "CD40F421FE7711FF773A8
D5C01EDF30201C000ED43EBF3011F00
EDB83AEDF3121B2BED4BEBF30D20EAC
9554C5452412048494748204 34F4C4F
52205245534F4C",6956
 109 DATA "5554494F4E20323036385
44F4F4C4B4954202020202047414 72D
6F2020202076657273696F6E20332E3
500000000000000000000000000000
00000000000000",2796
 500 REM SAVE HEXLOADER
 510 SAVE "ultra_1": PRINT " Ver
ify ";: VERIFY "": PRINT "OK":
STOP
 550 REM  Save Machine Code
 560 SAVE "ultra_c"CODE 62000,62
0: PRINT " Verify ";: VERIFY ""
CODE : PRINT "OK": STOP
```

```
  1 REM  DEMO1 GAG-o85
  5 PAPER 0: INK 0: RANDOMIZE U
SR 62048
  10 LET r=35: LET s=35: LET t=87
  20 FOR n=0 TO 2*PI STEP PI/55
  30 LET x=r*COS n: LET y=r*SIN n
  35 LET papink=(8*0)+((RND*6)+1)
  40 PLOT x+s,y+t
  45 INPUT USR 62069,papink,0
  50 NEXT n
  55 BEEP .1,-1: LET s$="....PRE
SS A KEY................"
  60 PRINT AT 20,0; BRIGHT 1; IN
K 4;CHR$ USR 62220: REM print s$
  70 PAUSE 0: FOR i=0 TO 31
  80 RANDOMIZE USR 62500: REM sc
roll right
  90 NEXT i
```

```
   1 REM    DEMO2 GAG-o85
   5 PAPER 0: INK 1: BORDER 0: R
ANDOMIZE USR 62048
   9 REM   house
  10 PLOT 8,10
  20 DRAW 48,0: DRAW 0,48: DRAW
-48,0: DRAW 0,-48
  30 PLOT 56,10: DRAW 70,20: DRA
W 0,48: DRAW -70,-20
  40 PLOT 8,58: DRAW 24,30: DRAW
 24,-30
  50 DRAW 70,20: DRAW -24,30: DR
AW -70,-20
  60 PLOT 0,130: DRAW 175,-10: D
RAW 80,10: DRAW 0,45: DRAW -255
,0: DRAW 0,-45: REM  sky
  70 PLOT 0,80: DRAW 30,30: DRAW
 135,-5: DRAW 90,-25: REM  grass
 300 PLOT  INVERSE 1,15,15: INPU
T USR 62105,5,0: REM  fill house
 310 PLOT  INVERSE 1,57,20: INPU
T USR 62105,6,0: PLOT  INVERSE
1,122,59: INPUT USR 62105,6,0
 320 PLOT  INVERSE 1,32,71: INPU
T USR 62105,2,0
 330 PLOT  INVERSE 1,175,150: IN
PUT USR 62105,1,0: REM  fill sky
 340 PLOT  INVERSE 1,0,116: INPU
T USR 62105,4,0: REM  fill grass
 700 CIRCLE  INVERSE 1,180,150,10
```

DK'Tronics Three Channel Sound Synthesizer

The DK'TRONICS Sound Synthesiser is a hardware and software combination using the AY-3-8912 programmable sound generator integrated chip -- the same as that used in the 2068.

The hardware portion comes attractively packaged complete with feed through connector for other peripherals. Also included is a four inch speaker in its own separate cabinet. A volume control sticks out the top which controls overall volume as well as the BEEP volume.

The chip itself has 14 internal registers, each dealing with a specific function of sound output. To create your own sound and noise effects, you must first enable the desired register and then fill it with the data for the sound you wish to make (same as with the 2068).

To enable a register, this interface uses OUT 63, register number (0-13). To send data, it uses OUT 95, data. The registers are used to control the tone of the three channels, the white noise frequency, the volume for each channel, the envelope period, the envelope shape, and the enabling of all channels.

The manual gives a good summary of all the register functions and musical note data. Also included in the manual are several short routines for you to use to program the synthesiser and instructions for using the software which comes with the package.

The software that comes with it allows you to set all the registers to any mode and enter on a piano-like keyboard displayed on the screen the music you wish to play. The program allows the use of a joystick supporting the DK'TRONICS, KEMPSTON, and INTERFACE 2 types.

The program comes up running and greets you with a menu at the top and a piano keyboard at the bottom. In the middle is a window for all three sound channels. You have the ability of programming three tunes each holding up to 768 notes (256 per channel). If you select tune 1 and choose the play option you will hear a pre-programmed tune. In my case it was Simon and Garfunkel's Parsley, Sage, Rosemary and Tyme.

As the tune plays, the current notes being played are displayed in the window, so you can easily find where the mistakes are while working on your own composition.

To program your own music, you would select the RECord option which turns joystick control (or arrow keys) to an arrow which can be moved to point to each of the keys on the piano-like keyboard. When you come upon the key which you want, you simply press fire or "0" and it is recorded into memory and is displayed in the window of the current channel being programmed. If you choose middle C which is in the third octave, it would be displayed as C3. Middle C# is displayed as C'3.

Available from DAMCO ENTERPRISES, 67 Bradley ct., Fall River, MA 02720 (617) 678-2110. Also available from ENGLISH MICRO CONNECTIONS and several dealers in England.

-- Joe Williamson

Review: ZX Computing Magazine

EDITOR'S NOTE: With this article, SUM is beginning a new series on other publications of interest to Timex/Sinclair users.

ZX COMPUTING is one of the most popular British publications devoted exclusively to the Sinclair computers. Having had a subscription to it for more than 2 years, there are certain things that can be said with confidence about it.

ZX COMPUTING covers both the ZX-81 and Spectrum computers. This is good news for users of the ZX-81 and TS-1000 since most other publications seldom provide information for these users. Every issue will have 2 or more complete listings of games and/or utilities just for the ZX-81. And these are generally quite substantial, requiring the 16K RAM and are quite sophisticated. A number of software and hardware reviews also appear in each issue as well as advertising by companies serving the ZX-81 market.

The Spectrum is the main computer supported by the magazine, with 8-10 programs listed in full each issue. Most listings are in BASIC, so they will run on the 2068 with no modification except for a few PEEK or POKE commands (or as is with ROMswitch or emulator). In addition, numerous reviews of hardware and software currently available is covered. For those with QLs, an occasional article is starting to appear for those machines. After two years, I have dozens of quite good games -- most of which I haven't had the time to type in. However, I have been generally happy with the quality of those I have entered, some of them true commercial quality.

Examples of programs found in the most recent issue:

1. Clock -- machine code utility for using the Spectrum's own built-in clock to display time;
2. Sappro -- space strategy game;
3. Pluto Adventure -- text adventure game;
4. QL Characteristics -- udg's on the QL;
5. Road Race -- ZX-81 graphics game
6. Spectrum Disassembler in BASIC;
7. FISH -- like the card game on Spectrum;
8. Ask Me Another -- educational program for Spectrum which can be customized;
9. Attack of the Mutant Wallies -- arcade game; a "wally" is the same as a "nerd";
10. Twenty-One -- similar to BlackJack but uses "computer dice" on the ZX-81.

The current issue had articles on machine code programming, microdrive tricks, full-size keyboard review, at least 12 software reviews, 4 book reviews, and lots of letters to the editor.

ZX COMPUTING is primarily oriented toward games as far as program listings go. However, the articles span the range from machine code to microdrive use, and from trouble shooting to book reviews. It is published six times per year and seems to always be on time. U.S.A. surface rates are $30/year. In addition, back issues and program listings on tape are available. A typical issue seems to be around 120 pages. Access (Mastercard) and Visa are accepted.

ZX COMPUTING Subscriptions, Infonet Ltd., Times House, 179 The Marlowes, Hemel Hempstead, Herts HP1 1BB, England.

Poor Man's Word Processor/TS-2068

This program was developed to be used with a "home brew" interface before I found John Oliger had a neat little interface that is hard to beat. The program can be used with any printer. Some modifications may have to be made since this one was for use with the JUKI 2200. (I don't recommend the JUKI 2200 however since, in my opinion, it has serious shortcomings, unknown to me, until after purchase.)

Enter the program as shown. To LOAD program, use LOAD "WP" or "". It will auto run when loaded. To become familiar with the program, STOP the program when prompted to do so by entering any letter. The program is looking for a number. A letter will stop it with error: 2 Variable not found, 1340:1.

LIST the program and notice the program has line numbers 1, 2, then skips to 999. These missing line numbers are used for DATA lines containing your material to be printed. Each paragraph is typed in using a line number and the DATA statement. Like this example:

10 DATA "This is the sentence to be printed."

Printed, it will look like this:

This is the sentence to be printed.

An empty DATA line results in a skipped line for paragraph seperation. An easier method is to use a comma and a pair of quotes at the end of a line. Example:

10 DATA "This is the sentence to be printed",""

The comma and double quotes prints a blank line.

The program starts at line 1330. A is the line counter. B is the page counter and is initially set at 49 (ASCII for 1). Poke 23609, 50 sounds a BEEP at each keystroke. POKE a smaller number to 23609 for a shorter BEEP or larger number for a longer BEEP.

Line 1340 selects number of characters printed per inch. If your printer does not have this capability, you will need to know haw many characters per inch your printer does print and change line 1340 to: 1340 LET E=n. Where n equals characters per inch and DELETE lines 1339, 1350, and 1360.

Line 1370 lets you select printer line length. The numbers printed on the screen suggest three sizes. However any reasonable number, including fractions like 4.5, 4.6, 5.4 etc. can be used.

Selection is done by: E (set in line 1340) * number selected (F)= number of characters per line (D). Example: If E=12 and 4 is entered, 12*4=48 characters per line.
characters per line direct, change line 1340 to: 1340 INPUT;"Enter number of characters per line ";D. Any method may be used but since D=number of characters per line, it must be defined. Lines 1380 to 1405 set the parameters for the JUKI. DELETE these lines or change as needed for your printer.

Lines 1410 to 1440 allow entering of prerecorded DATA files. Press M and start tape. When tape is loaded, printing will start automatically. If the program already has a data file within, pressing ENTER will start the printing process. CAUTION: Do not enter a DATA file that uses lines 1, 2 or 999 to 1510. TO do so will invalidate the program.

Before printing starts, several things take place. First, line 1450 determines if this is the first page to be printed. If it is, the program goes to line 1510 where A is moved from 1 to 7. This shortens the page by 7 lines to allow for headings. If not the first page, then lines 1469 to 1500 are executed. If this is not the first page, line 1470 prints page number then skips a line before printing continues.

Line 1469 checks to see if the printer is busy. If it is, the line loops itself until the printer is no longer busy. This same check will be found before each OUT statement where needed.

Line 1500 directs the program to line 1010. Lines 1010 to 1090 loads A$ with first, or next DATA statement and looks at the end of the line to see if it ends in a

space. If not, a space is entered between the first and second word and the check is made again. If there is still no space at the end, a space is added between the second and third word and continues until a space is found at the end of the line.

When all lines in the DATA statement are properly spaced, the sentence or paragraph will be printed on the screen and to the printer. Because the screen is only 32 characters wide, it will not illustrate the actual printing. What you see is NOT what you get.

Lines 1095 to 1130 send one character at a time to the printer. Line 1120 checks to see if the proper number of characters per line have been printed. When line is full, line 1160 counts the line number and outputs a line feed to the printer. Line 1170 resets V, the character counter and returns to the printing loop.

Line 1140 sets printer to the next line and goes to line 1000 where the line count variable A is checked to see if 52 or more lines have been printed. If not, another DATA statement is loaded into A$ and the procedure is repeated.

If more than 52 lines (45 for 1st page) have been printed, program goes to line 1290 where program is halted and message to change paper is printed. Entering a P in either upper or lower case continues printing at line 1470.

The program continues until all DATA lines are sent to the printer. At this time the program stops with out of data statement. To reprint the same text, RUN the program again.

There will be a delay between a request for printing and actual printing. This delay is due to the time it takes for the BASIC program to check for and introduce spaces between words. Generally, the longer the sentence or paragraph, the longer the delay.

There are a couple of pitfalls to be aware of. If the line length selected is too short or there are too many long words in the line, there may not be enough spaces available to arrive at a space at the end of the line. Spaces are only added one time between each word. If this does not bring a space to the end of the line, a word will be broken. This happens so seldom it is not considered a problem. If it does, rearrange the sentence.

The lines in a complete paragraph are counted before the algorithm for end of page is executed. This was done to enable the complete paragraph to be printed intact. If the last paragraph is too long you can run out of paper. Again this has not been a problem but can happen. If this becomes a problem, change the count in line 1000 to less than 52.

A backup copy of this program is recommended. Use GOTO 1280 to SAVE. Program will auto run when loaded. Good printing!

-- Thornton E. Benson
Benson, AZ

```
  1 REM *WORD PROCESSOR FOR
JUKI LETTER PRINTER. Thornton E.
 Benson. Δ 1985
  2 GO TO 1330
 999 REM *COUNTS LINE NUM. FOR
 END OF PAGE, ISERT SPACE IN
 FIRST LINE OF TEXT. SENDS TEXT
 TO PRINTER IF LESS THAN ONE
 LINE LONG.*
1000 IF A>=52 THEN GO TO 1290
1010 CLS : READ A$
1020 IF LEN A$<D+1 THEN GO TO 10
95
1027 REM *ALGORITHIM FOR INSERT
 SPACES UNTIL SPACE AT END OF
 LINE*
1030 LET N=0
```

```
1035 FOR N=N TO LEN A$ STEP D
1040 IF N+D>LEN A$ THEN GO TO 10
95
1045 FOR X=N+1 TO N+D
1050 IF A$(N+D)=CHR$ 32 THEN GO
TO 1080
1052 IF X-1=0 THEN GO TO 1080
1055 IF A$(X)=" " AND A$(X-1)<>"
 " THEN GO TO 1070
1060 GO TO 1080
1065 STOP
1070 LET A$=A$( TO X)+" "+A$(X+1
 TO )
1075 IF A$(N+D)=CHR$ 32 THEN NEX
T N
1080 IF N+D>LEN A$ THEN GO TO 10
95
1085 NEXT X
1090 NEXT N
1091 REM *PRINTS PARAGRAPH AND
 SENDS LETTERS ONE AT A TIME TO
 PRINTER*
1095 LET A=A+1: PRINT A$
1100 LET V=1
1105 FOR Z=1 TO LEN A$
1109 IF IN 127=253 THEN GO TO 11
09
1110 OUT 127,CODE A$(Z)
1115 LET V=V+1
1120 IF V=D+1 THEN GO SUB 1160
1130 NEXT Z
1139 IF IN 127=253 THEN GO TO 11
39
1140 OUT 127,13
1150 CLS : GO TO 1000
1160 LET A=A+1: OUT 127,13
1170 LET V=1: RETURN
1178 REM *SAVES PROGRAM AND
AUTO RUN ON LOAD*
1280 SAVE "WP" LINE 1
1285 STOP
1289 REM *STEPS PAPER TO NEXT
 PAGE AND NUMBERS PAGE*
1290 PRINT AT 10,6;"Change paper
"
1310 INPUT "Enter ""P"" to conti
nue ";Q$
1320 IF Q$="p" OR Q$="P" THEN GO
 TO 1470
1325 GO TO 1310
1329 REM *START OF PROGRAM*
1330 LET A=1: LET B=49: POKE 236
09,50
1335 PRINT AT 10,3;"""STOP"" pro
gram at this time";TAB 4;"to ent
er text by entering";TAB 4;"any
LETTER."
1339 REM *SETS PRINTER PARAMETER
S*
1340 INPUT "SELECT PITCH: 10, 12
 OR 15 ";E: CLS
1350 IF E<>10 AND E<>12 AND E<>1
5 THEN GO TO 1340
1360 IF INKEY$<>"" THEN GO TO 13
60
1369 REM *SELECTS LINE LENGTH &
PROGRAMS PRINTER*
1370 INPUT "ENTER LINE LENGTH (4
TO 7)       4=NOTE SIZE: 6=LETTE
R SIZE      7=FULL PAGE. ";F: LE
T D=INT E*F
1380 IF E=10 THEN LET F=13
1390 IF E=12 THEN LET F=11
1400 IF E=15 THEN LET F=9
1405 OUT 127,27: OUT 127,31: OUT
 127,F
1409 REM *PROVISIONS FOR ENTERIN
G PRERECORDED FILES*
1410 CLS : PRINT AT 10,2;"TO MER
GE FILE TOUCH ""M""";AT 12,2;"TO
 PRINT TOUCH ""ENTER""""
1420 LET Y=CODE INKEY$: IF Y<>10
9 AND Y<>77 AND Y<>13 THEN GO TO
 1420
1430 IF Y=13 THEN GO TO 1450
1435 CLS : PRINT AT 10,3;"INSERT
 TAPE AND PRESS PLAY"
1440 MERGE ""
1449 REM *IF NOT 1ST PAGE NUMBER
S PAGE, RESETS LINE COUNTER &
ADVANCES PAGE COUNTER*
1450 IF B=49 THEN GO TO 1510
1469 IF IN 127=253 THEN GO TO 14
69
1470 OUT 127,B: OUT 127,13
1480 LET A=1
1490 LET B=B+1
1500 GO TO 1010
1509 REM *SETS 1ST PAGE 7 LINES
SHORTER FOR HEADING ROOM*
1510 LET A=7: GO TO 1490
```

Enhancing the A & J Microdrive

Here is my collection of some of the programs I have come up with which will enhance some of your programs (like Tasword and VU-Calc) to make full use of your Microdrives.

With Tasword, one hint that will help in re-saving text files when several are on one tape is to place several asterisks at the last position in the file in line 300. This will create a file on tape capable of holding up to 300 lines, even though your current file is smaller. This will prevent saving over the next program or file on that tape.

-- Howard Ballinger

```
  1 REM     "@1" 2-1-85
      (Howard A. Ballinger
          636 Albemarle,
       El Cerrito Ca 94530)
        update of 8-9-85
  2 REM    [illegible]

Save me onto the beginning of an
A & J Micro Drive microtape and
you can catalog its contents on
screen or on a TS-2040 printer.

  3 REM      ... I fold up the
catalog lists from the printer
and keep 'em in a folder with
the microtapes themselves --
 neat !!
  4 REM [illegible]
  5 REM
      TO USE, TURN OFF printer;
    INSERT the tape in the drive,
    ENTER LOAD "@1" and then just
          follow prompts.
  6 REM    To SAVE me to another
            microtape, see menu.
  9 REM [illegible]
  19 BORDER 0: PAPER 0: INK 7: C
LS : RETURN
  20 BORDER 7: PAPER 7: INK 0: C
LS : RETURN
  22 BEEP .1,12: BEEP .1,-12: BE
EP .1,16: RETURN
  23 BEEP .1,7: BEEP .1,19: RETU
RN
  60 GO SUB 23: GO SUB 19: PRINT
 AT 3,14;"AT-ONE";AT 4,14;"
";AT 6,2;"1 to catalog this Mic
rotape";AT 8,2;"2 to load a file
";AT 12,2;"0 to enter Basic"
  61 PRINT AT 10,2;"3 to save At
-One"
  62 LET w$=INKEY$: IF w$="" THE
N GO TO 62
  63 IF w$="1" THEN GO SUB 20: G
O SUB 22: PRINT AT 10,1; PAPER 5
;"TURN PRINTER ON IF YOU WANT TO
": PAUSE 120: CLS : LOAD "@1"
  64 IF w$="2" THEN GO SUB 20: G
O SUB 22: PRINT AT 8,2;"ENTER ex
act filename (starts    with ""@
"")": INPUT l$: GO SUB 23: LOAD
l$
  66 IF w$="0" THEN GO SUB 20: B
EEP .1,16: BEEP .3,-12: GO TO 99
99
  67 IF w$="3" THEN GO TO 99
  69 GO TO 62
  70 REM
  71 PRINT AT 2,19;"[illegible]";AT
 4,19;"of S/F # 1";AT 5,19;"
[illegible]": FOR t=1 TO 21: PRINT AT
 t,0;"          ";CHR$ (49+t);":": N
EXT t
  72 PRINT AT 8,19;"File # for";
AT 9,19;"next SAVE";AT 10,19;"is
 marked";AT 11,22;"""@1""": COPY
 : INPUT "Press ENTER to proceed
 "; LINE q$
  73 GO TO 60
  90 GO SUB 22: GO TO 70
  99 GO SUB 23: PRINT AT 16,6;"s
aving ...": SAVE "@1,1" LINE 90:
 PRINT AT 18,10;"verifying ...":
 GO SUB 23: VERIFY "@1": GO SUB
22: GO TO 9999
```

```
 10 REM [illegible]

 40 GO TO 9000
 50 PRINT '''"[illegible]"
 55 INPUT "ID code for this tap
e: ";T$
 100 GO SUB 8888: SAVE "@1,+"
 200 LET A=1
1000 REM
1050 DIM f$(87,100)
1090 ON ERR GO TO 7000
1100 LET A$=STR$ A: SAVE "@"+A$+
",BlnkFl"+A$ DATA f$()
1110 ON ERR RESET
1150 VERIFY "@BlnkFl"+A$ DATA f$
()
1200 POKE 23692,255: PRINT "  NO
W ";A*10;"K. BYTES ARE CHECKED.
  "'''"[illegible]"
1250 PRINT
1500 LET A=A+1: GO TO 1090
2100 SAVE "@1,TapeChk" LINE 9000
: PRINT AT 21,19;"[illegible]"
: VERIFY "@TapeChk"
2200 LET A=1
2300 BORDER 0: INK 7: PAPER 0: C
LS
2400 PRINT AT 4,0
3050 DIM f$(87,100)
3100 ON ERR GO TO 4000
3110 LET B$=STR$ (A+1): LET A$=S
TR$ A: SAVE "@"+B$+",blnkFl"+A$
DATA f$()
3120 ON ERR RESET
3150 VERIFY "@blnkFl"+A$ DATA f$
()
3200 POKE 23692,255: PRINT "  NO
W ";(A*10+3);"K. BYTES ARE CHECK
ED."'''"[illegible]"
3250 PRINT
3500 LET A=A+1: GO TO 3100
4000 ON ERR RESET
4010 ON ERR RESET
4020 LPRINT TAB 10;"* * * * * *
"'''"PHASE II:";10*(A-1)+3;" K. O
F FILES SAVED"'"& VERIFIED, INCL
UDING ""@TapeChk""'"   Bye!"'''
4100 GO TO 9999
6700 CLEAR : SAVE "TapeChk" LINE
 9000: SAVE "TapeChk" LINE 9000:
 VERIFY "TapeChk": GO TO 9999
7000 ON ERR RESET
7050 LPRINT ''"""@TapeCheck"" Re
port for"'" Microtape ";T$
7100 LPRINT '"SAVED & VERIFIED "
;A-1;" FILES OF"'"ABOUT 10 K.LEN
GTH COUNTING GAPS.NO ERRORS SO F
AR, PROCEEDING    WITH PHASE II.
"''';
7150 CLEAR : PRINT AT 21,0;"[illegible]
7200 GO TO 2000
8800 PRINT #1;AT 0,0;"at END OF
FILE ...   GO TO 7000": RETURN
8888 CLS : FOR n=1 TO 22*32: PRI
NT FLASH 1;"▒": NEXT n: PRINT A
T 10,10; PAPER 4;" @TAPECHK "
8889 FOR n=9 TO 11 STEP 2: PRINT
 AT n,10; PAPER 6;"          ":
 NEXT n: REM   that's 10 spaces
8990 PRINT AT 21,0: RETURN
9000 REM [illegible]
9005 INK 0: PAPER 7
9010 CLS : BORDER 2: PRINT AT 9,
5; PAPER 5;" PUT PRINTER ONLINE
": INPUT ;"then press [illegible]
  "; LINE H$: CLS
9899 GO TO 50
```

```
 1 REM [illegible]
        THIS IS "@tz"

   2 REM        ... a modified
version of Tasword (© of course)
basic, for the A & J Micro Drive

   3 REM  INSTRUCTIONS
To use, get out your cassette of
Tasword and load it into the
2068. Press STOP, "b", & ENTER
twice. Insert a fresh formatted
microtape, 35 or 50 ft. length,
into the Micro Drive.

   4 REM        ... Now, type
the following lines (not the REM
statements, however) into the
Basic part of your program. When
finished, just RUN it, go back
to the menu, press "t" and stand
back !!!

   8 GO SUB VAL "11"
  11 BEEP VAL ".03",VAL "16": BE
EP VAL ".03",VAL "23": RETURN
  15 POKE VAL "23609",VAL "2": C
LEAR VAL "33279": GO SUB VAL "40
00": PRINT AT VAL "1",VAL "0": L
OAD "@tasword"CODE : CLS : GO SU
B VAL "11": LET a=USR VAL "59081
": GO TO VAL "10"
 300 CLS : GO SUB VAL "4000": PR
INT "Printer control graphics ch
ars:"
 400 CLS
 401 GO SUB VAL "4000": PRINT AT
 VAL "3",VAL "0";"just [illegible] to
keep values given:"
 699 CLS : GO TO 9999
 700 CLS : LET i=VAL "8": GO SUB
 VAL "800": LET a$="tasword": SA
VE "@2,tz" LINE VAL "15"
 710 SAVE "@3,tasword"CODE VAL "
54784",VAL "10751": GO SUB VAL "
900"
 780 VERIFY "@tz": PRINT AT VAL
"21",VAL "0";"[illegible]
";AT VAL "19",VAL "0";
 790 VERIFY "@tasword" CODE VAL
"54784",VAL "10751": PRINT AT VA
L "21",VAL "20";"[illegible]": GO TO VAL "25"
 800 PRINT AT i,VAL "0";"saving
""@tz"" & Tasword © CODE": RETUR
N
 900 PRINT AT VAL "12",VAL "5";"
verifying ...": RETURN
 920 REM   DELETE THIS LINE
 930 REM   DELETE THIS LINE
 940 REM   DELETE THIS LINE
 945 REM   DELETE THIS LINE
1030 LET i=VAL "12": CLS : PRINT
 '''"  saving ";a$: SAVE a$CODE
 b,a: CLS
1050 REM   DELETE THIS LINE
1098 IF a$(1)="@" THEN PRINT '''"
      verifying ...": VERIFY ("@
"+ a$(4 TO ))CODE b,a: GO TO VAL
 "1110"
2010 PRINT AT VAL "12",VAL "2";"
just press ENTER to load the";AT
 VAL "14",VAL "2";"first file (c
assette only)"
9999 GO SUB 4000
```

```
  1 STOP
  2 REM
```

MODIFIED BASIC
A & J VU-FILE

```
  3 REM   TO USE, LOAD Vu-File
from your cassette -- press "l"
then break to get to basic --
LIST the basic and fix it so it
looks like this. Insert a blank
microtape and enter GO TO 40 for
auto-save.

  4 REM  No, don't type the
         REM statements.

  5 REM TO LOAD A FILE FROM
        CASSETTE, GO TO 45

 40 INPUT "BLANK TAPE IN DRIVE
0   "; LINE b$
 42 SAVE "@1," LINE 50: VERIFY
"@": SAVE "@2,vfc"CODE 28288,721
6: VERIFY "@vfc"CODE : GO TO 999
9
 45 CLS : PRINT '''''  play the
cassette ...": GO SUB 6000: LOAD
 ""CODE s: GO TO USR a
 50 BORDER 1: PAPER 1: INK 1: C
LEAR 28287: LOAD "@vfc"CODE
```

```
 100 INK 7: DIM f$(32): LET a=28
291: BEEP VAL ".2",VAL "18": BEE
P VAL ".1",VAL "34": GO TO USR 2
8288
1000 CLS : PRINT '''''      savin
g ...": GO SUB 6000: GO TO USR a
1005 SAVE "@3,file"CODE s,l: PRI
NT '''''      verifying ...": PRIN
T
1100: VERIFY "@file"CODE : BEEP
.2,18: BEEP .1,34
1200 GO TO USR a
2000 CLS : PRINT '''''      loadin
g ...": GO SUB 6000: LOAD "@file
"CODE s: GO TO USR a
3000 LPRINT f$( TO 32): GO TO US
R a
6000 LET g$="@file": LET f$( TO
10)=g$: LET s=CODE f$(11)+256*CO
DE f$(12): LET l=CODE f$(13)+256
*CODE f$(14): RETURN
```

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Header-Reader for 2068

Loading a program into the 2068 is always divided into two parts, The Header and then the program or bytes or array.

R-HEADER reads the header without loading the program. The header contains the following information:

1. Program Type (BASIC, code, array)
2. NAME
3. Length with and without variables
4. Auto-Run line (BASIC)
5. Byte Origin (Code)

Type in the listing and save it before RUNning. Then RUN, Follow instructions. The program will list contents of any headers it encounters from tape.

Real Gagnon
Quebec

.Listing 1 : R-HEADER program

```
  1 REM ___________R-HEADER 2068 by GAGNON-o85___________
  2  CLEAR 31999
  5 BORDER 0: PAPER 0: BRIGHT 1: INK 5: CLS
 10 GO SUB 1000
 50 CLS : GO SUB 600: BEEP .01,10: PRINT  AT 10,9; INK 0; PAPER 6; FLASH 1;"STA
RT CASSETTE"
 60 RANDOMIZE  USR 32000
 65 BEEP .01,45
 69 CLS : GO SUB 600
 70 LET ix=32256
 80 LET type= PEEK ix
 90 PRINT  INVERSE 1'("Program:" AND type=0)+("Numeric Array:" AND type=1)+("St
ring Array:" AND type=2)+("Bytes Block:" AND type=3);
100 PRINT  INVERSE 0;" ";: FOR n=ix+1 TO ix+10: PRINT  CHR$  PEEK n;: NEXT n
110 PRINT  INVERSE 1''+("Prog. + Variable " AND type=0)+("Code " AND type);" Le
ngth:";
120 PRINT  INVERSE 0;" "; PEEK (ix+11)+256* PEEK (ix+12)
130 IF type=1 OR type=2 THEN  PRINT  INVERSE 1'"Variable:";: PRINT  INVERSE 0;"
 "; CHR$ ( PEEK (ix+14)-32-64*( PEEK (ix+14)>192))+("$" AND type=2): GO TO 175
140 PRINT ': PRINT  INVERSE 1;("Auto-Run Line:" AND type=0)+("Block Origin:" AN
D type=3);
150 PRINT  INVERSE 0;" "; PEEK (ix+13)+256* PEEK (ix+14)
155 IF type=3 THEN  GO TO 175
160 PRINT  INVERSE 1'("Program Length:" AND type=0);
170 PRINT  INVERSE 0;" "; PEEK (ix+15)+256* PEEK (ix+16)
175 PRINT ''' OVER 1;"................................"
180 PRINT '' OVER 1;" S: STOP        ENTER: CONTINUE ": PAUSE 0: IF  INKEY$ ="s
" OR  INKEY$ ="S" THEN  STOP
190 RUN
600 PLOT 0,0: DRAW 255,0: DRAW 0,175: DRAW -255,0: DRAW 0,-175: PRINT  INVERSE
1; AT 0,9;"R-HEADER 2068"; AT 1,9;" GAGNON-o 85 "''
610 RETURN
1000 REM _____________the M.C.
1010 DATA 221,33,0,126,175,17,17,0,55,1,254,254,205,153,100,205,252,0,186,32,240
,219,255,203,191,211,255,175,211,244,201
1020 FOR I=32000 TO 32030: READ A: POKE I,A: NEXT I
1030 RETURN
9991 SAVE "lect2068" LINE 1: VERIFY "lect2068"
```